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HOME UNIVERSITY
ENCYCLOPEDIA

—*An Illustrated Treasury of Knowledge*—

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WITH SPECIAL ARTICLES AND DEPART-
MENTAL SUPERVISION BY 462 LEADING EDITORS,
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Tehuantepec

Tehuantepec, an isthmus of Mexico, between the Gulf of Tehuantepec, an arm of the Pacific Ocean, and the Gulf of Campeche, an arm of the Gulf of Mexico. It is 125 m. in breadth at its narrowest part, and is traversed by the Sierra Madre, which here subsides to a plateau only 730 ft. above sea level. Interest in the Isthmus centres mainly in the Tehuantepec National Railway, which has become one of the important commercial routes of the world. The main line of this road runs from Puerto Mexico (Coatzacoalcos) on the Atlantic to Salina Cruz on the Pacific, a distance of 189 m. The port of Puerto Mexico is the Atlantic terminus of the railroad. The Coatzacoalcos River forms a natural harbor of unlimited capacity. Vessels of 30 ft. draught may dock.

The Pan-American Railway was completed in 1909, and its main length (1930) was 284 m., from Gamboa on the Tehuantepec National to the Guatemalan Railway system.

Tehuantepec, river port, Oaxaca, Mexico, on the Tehuantepec River; about 15 m. from its mouth, and 19 m. n.w. of Salina Cruz. There is trade in indigo and cochineal, and textiles of silk and cotton. The population, mostly Indians, numbers about 11,000.

Tehuantepec Winds are strong winds, analogous to the mistral and bora, experienced on the Pacific side of Central America.

Tehuelches, the aborigines of Patagonia, whose range extended originally from the Río Negro into the eastern parts of Tierra del Fuego.

Tejon Series. The Eocene of the Pacific Coast is represented by a series of mostly marine clastic strata, best known in the southern part of the great valley of California.

Tekax, town, state of Yucatan, Mexico, 50 m. by rail s.e. of Mérida; p. 25,000.

Telamon, in ancient Greek legend, a son of Æacus and brother of Peleus. He and Peleus slew their half-brother Phocus, and Telamon had to flee from Ægina to Salamis, where he married the daughter of the king.

Telautograph, or automatic reproducing telegraph, an apparatus by which a message written or a sketch made with a stylus in the hand of the transmitting operator is reproduced identically and automatically on a local or 'pilot' receiver and simultaneously on a distant receiver or a number of such receivers connected to the transmitter in multiple. The transmitter is connected to the receivers by two line wires, either direct or through a cen-

Telegraphone

tral switching station, each telautograph station being equipped with a 'set' of transmitter and receiver associated together to form a complete sending and receiving unit. Incoming messages are received on the pilot receiver, using the same paper message strip upon which outgoing messages are recorded.

Tel-Aviv, city in Israel, on Mediterranean Sea; noted as only wholly Jewish city in world. Founded before W.W. I, has grown into typical Eur. city. Hebrew is language of gen. use.

Telegonus, a son of Circe by Odysseus. He was sent by her to find his father, and, landing in Ithaca, was attacked as a pirate by Odysseus and Telemachus. He slew Odysseus, not knowing who he was. Then, at the command of Athena, he, with Telemachus and Penelope, took Odysseus' body to be buried in Circe's land, Aeaëa; afterward he married Penelope. He is said to have founded Tusculum and Praeneste in Italy.

Telegraph, Military. The military telegraph is used at the front to keep in communication with more permanent points in the rear. It is often the sole means of communication, but is sometimes used to supplement existing lines. In the U. S. service the military telegraph line is constructed and operated by the Signal Corps troops, one company to each army division.

Telegraphone. This device is, in principle, a development of Alexander Graham Bell's electromagnetic telephone. By it speech is magnetically recorded on a hard steel wire. It was patented by Valdemar Poulsen, a Danish physicist, who has made important advances in wireless telegraphy and telephony.

The telegraphone consists essentially of (1) a fine-wire magnet, the counterpart of the magnet in Bell's telephone receiver, and (2) an arrangement for passing a long, small, hard steel wire past the pole pieces of the magnet. This magnet winding receives the oscillatory currents from a small hand telephone set, corresponding to the vibrations of the transmitter diaphragm in response to the sound waves impressed. These currents, traversing the recording coil, vary the magnetization of the coil therein, and also of the steel wire moving past. The alterations of magnetic condition persist in the wire until removed by the imposition of other magnetic forces, etc. If, after receiving a record, the wire is wound back on the first reel, and moved forward again past the

recording-coil pole pieces, 'the peculiar magnetic arrangements, forming the record, will change the magnetic field in the recording coil and, by passing through a telephone receiver the currents induced in the winding of the recording coil, the original sounds may be reproduced.

Telegraphy. Perhaps the first form of electric telegraph was suggested by an anonymous writer in *Scots Magazine*, in 1753, following a few years after the announcement by Stephen Gray and Granville Wheeler that the charge of a Leyden jar would follow along an insulated wire and indicate its presence by an electroscope at the far end.

The second stage in telegraph development followed the discoveries of Galvani and Volta of the generation and detection of electricity by chemical means. Soemmering in 1809 developed a device to signal by decomposing water; Coxe, an American, suggested the decomposition of salt solutions; and Robert Smith, Bain, Edward Davy and Morse had various arrangements for recording messages on chemically prepared tape.

The third stage, and that which finally led to the present successful type of electromagnetic telegraph, had its beginning in the discovery by Oersted, in 1820, that an ordinary magnetic needle, suspended so that it is free to swing, will be deflected from its usual position whenever it is in the vicinity of a closed electric circuit, a fact previously discovered by Romagnosi in 1802, but not widely known. The second fact essential to electromagnetic telegraphy, discovered by Arago and by Davy independently in 1820, was that while there is a current in copper wire it attracts iron filings and is capable of developing magnetism in soft iron. In the same year Ampère, after experimenting at Laplace's suggestion, confirmed the possibility of deflecting a magnetic needle at a great distance from the battery. Schilling developed what appears to be the first practical magnetic telegraph by using five galvanometers, each provided with an independent galvanic circuit. He gave each needle a positive and a negative motion by means of reversed currents and then combined two or more of these signals to produce the letters of the alphabet. Schilling was the first to devise an alarm signal which was sent at the beginning of the message.

Signalling at any great distance by means of electricity was unsuccessful until the formulation of the laws of electromagnetism about 1830, which was done independently by Faraday in England and Joseph Henry in America. Henry, who was a professor of mathematics at

Albany Academy and later professor of natural philosophy at Princeton, by using an electromagnet with a great many turns of silk-covered wire wound approximately at right angles to the core, and a battery of 12 to 24 cells, produced an electromagnetic instrument of sufficient power to overcome the difficulty of signalling to great distances.

Then Samuel F. B. Morse, professor of fine arts in the New York University, designed an ink recording machine to take down the current impulses, worked out the American Morse alphabet, and with the assistance of Alfred Vail arranged a complete working system and reduced the effort and time necessary to send and receive a telegraph message. It was only after several years' effort that he was able to get the necessary financial support for his ideas, but in 1844, following assistance from Congress, a telegraph line was successfully opened between Washington and Baltimore, a distance of about 40 m. The ink recorder was later replaced by a sounder, and this type of instrument, together with its auxiliary relays and apparatus, handles a large proportion of the telegraph messages of today.

Not content with having a single telegraph working on the single wire with the earth as the return, inventors next turned their attention to the problem of sending and receiving a message at the same time on one wire, or 'duplexing.' J. W. Gintl of Vienna attempted this in 1853, but it was an American, J. B. Stearns of Boston, who produced the first commercially successful duplex telegraph system, about 1871. Another scientist of Vienna, Dr. J. B. Stark, tried to solve the problem of the 'quadruplex,' whereby two messages might be sent and two received on the same wire at the same time, but it remained for Edison, about 1874, to produce a really workable system, which, with modifications, is still in use.

Submarine telegraphy was first suggested by a Spaniard in 1795, but the first working cable was that of Morse (1842) between Castle Garden and Governors Island, New York. Ezra Cornell, one of Morse's assistants, then laid a more successful cable from New York to Fort Lee, a distance of about 12 m. The discovery of gutta percha in 1842 gave cable engineers better facilities. In 1941 the submarine cable system of the world embraced about 360,000 mi. During World War II radiotelegraph submarine channels were multiplied or expanded to many parts of the earth. See RADIO.

Bibliography.—Consult the *Journal of the A.I.E.E.*; J. J. Fahie, *A History of Electric Telegraphy to the Year 1837*; Gibson, *How the Telegraph and Telephone Work* (1909).

Telemachus, in ancient Greek legend, son of Ulysses and Penelope, was an infant when his father left home to join in the war against Troy, but during the latter's twenty years' absence grew into manhood. Under the guidance of Athene, who had assumed the appearance of Mentor, Telemachus set out in search of his long-lost sire, after having vainly endeavored to eject his mother's troublesome suitors from the house. Having visited Pylos and Sparta, Telemachus returned home to Ithaca, where he found his father in the guise of a beggar, and with him proceeded to slay the suitors. He succeeded Odysseus as king of Ithaca.

Teleology, signifies by derivation 'a doctrine of ends,' and as a philosophical term is used in connection with two special problems: (1) Is the conception of end required for the explanation of organic life or is the organism simply a very complex mechanism? (2) Is it permissible to interpret the world as a whole in terms of end as a purposive system?

For the modern form of these problems, which are not of modern date, we may refer to Kant's *Critique of Judgment*. His answer to the first is rather complicated and difficult. On the one hand, he is convinced that living things will never be explained on merely mechanical principles. The organization which makes all the parts of a living thing the expression of the single life of the whole is incapable of such explanation. On the other hand, he had already shown, in his analysis of the principles of science, in his *Critique of Pure Reason*, that all that happens, every event in nature, must come under the mechanical law of cause and effect, and it is impossible to except living beings from the range of this absolutely universal law of experience. His somewhat unsatisfactory solution is to maintain the teleological point of view as indispensable for our judgment, while denying to it any ultimate scientific necessity as regards the objects themselves. That is to say, we cannot help looking upon living things as if they were other than mere mechanisms; but we cannot affirm as a proposition of science that they are not mechanisms, nor can we withdraw them from the scope of mechanical law.

The answer Kant gives to the second problem is similar in method, but turns on the difference between the scientific and the ethical point of view. We cannot help thinking of the world as a whole, as governed by the highest end we know—viz., the moral end. On the other hand, this teleological, or more definitely theological, conception of the world

remains a practical postulate which conveys no scientific knowledge of the actual structure of the world; and the attempted argument from the actual structure of the world to a designing mind as its cause—the teleological proof of the existence of God—is condemned by Kant as invalid.

For this rather tentative recognition of purpose in the world, as indicated by the facts of organic life and by the demands of our moral consciousness, Kant's idealistic successors, and especially Hegel, sought to substitute a conception of the world as through and through the expression of mind or reason. See MATERIALISM; THEISM.

Consult Janet, *Final Causes*; Hobhouse, L. T., *Development and Purpose* (1913).

Teleosaurus, a genus of fossil crocodiles, the remains of which occur in the Lower Jurassic rocks. Both surfaces of the vertebrae were slightly concave, the hind legs large and strong; the anterior portion of the body gradually tapered into long and slender jaws. The jaws were armed with numerous equal and slender teeth, slightly recurved.

Telepathy, a term first employed by the members of the Society for Psychical Research, in 1882, to designate 'the communication of impressions from one mind to another, independently of the recognized channels of sense.' The Society and numerous individuals have made experiments to establish the fact of the existence of telepathy. Consult Rhine's *Extra-Sensory Perception* (1934), and *New Frontiers of the Mind* (1937).

Telephony, a term covering the entire art of speech transmission by means of the electric speaking telephone and the multitude of devices, instrumentalities, and methods which have been devised and developed for use in connection therewith. The electric speaking telephone was invented by Alexander Graham Bell in 1875. The principle as conceived by Bell at that time was embodied in a pair of crude telephone instruments connected by about 100 ft. of wire, by means of which speech sounds were transmitted from one room to another in a building in Boston, hearing being accomplished only with the greatest difficulty.

In contrast to this primitive state of the art in 1875, it is now possible, 1935, in the United States alone, to establish not only telephonic communications as desired between practically any two of the more than twenty million telephone stations, scattered from Maine to California, but also to connect by wire lines with telephones in Canada, Cuba

and Mexico. By means of transoceanic telephone circuits connection can be had to all of Europe except Russia, to a large part of South America, to Australia and Northern Africa. On Dec. 7, 1934, telephone service was inaugurated between the United States and Japan. In all, practically any telephone in the United States can be connected with any one of 40,000,000 out of 41,100,000 telephones of the world.

Bell's Invention.—For many years previous to Bell's invention, numerous scientists and inventors had been striving to transmit speech electrically. They succeeded in transmitting musical sounds, but because they were dealing with 'make-and-break' electrical currents, they failed to transmit intelligible speech.

The last sentence of Bell's patent describes concisely the principle underlying successful operation of the telephone: 'The method of, and apparatus for, transmitting vocal or other sounds telegraphically, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds.'

When words are spoken into a telephone transmitter, the acoustic waves that are set up in the air by the voice of the speaker are transformed by the transmitting instrument into electrical waves of the same shape and form as the acoustic waves. These electrical waves traverse the circuit extending from the transmitting station to the receiving station, where they are re-transformed, by means of the receiving instrument, into acoustic waves which convey the words to the ear of the listener.

Extension of Transmission Limits.—New York and Boston were first placed in telephonic communication in 1884. By 1893 New York and Boston were talking to Chicago, and one-half of the people in the United States were within talking distance of each other. Several years later Omaha and St. Louis were reached, and remained the extreme western limits until, in 1911, by means of loading coils applied to the heaviest copper wires in use (No. 8 B. W. G. 0.165 inch in diameter), telephone service became possible between New York City and Denver. In January, 1915, the transcontinental line of the Bell System, from New York to San Francisco, 3,400 m. in length, was placed in commercial service. The original line employed both loading and repeaters. In 1920 the loading coils were removed and additional telephone repeaters introduced, this change greatly increasing the width of the 'band' or frequencies transmitted. In 1921 the

United States was connected with Cuba by means of three telephone cables joining Key West with Havana. These cables are about 115 m. long and depths of more than a mile are reached in some places.

Loud Speaking Telephones.—By means of specially designed transmitters and receivers (the latter provided with huge projectors) operating in conjunction with amplifying devices of high power, it has been made possible to magnify the energy of the voice currents billions of times, thus affording a means whereby public speakers can address vastly larger audiences than was previously possible.

Increasing the Number of Messages over a Pair of Wires.—By connecting together two pairs of open wires, making use of suitably balanced terminal coils and specially devised transpositions in the line itself, it is possible to carry on simultaneously and without mutual interference, three conversations; one over each pair of wires in the ordinary manner and the third over all four wires, the two wires of each pair, in multiple, forming one conductor of the third or 'phantom' circuit.

First proposed in the United States by Carty, in 1884, the phantom principle, although yielding some results under favorable conditions, remained for many years scarcely more than an interesting scientific curiosity. It was not until about 1904 that advances in the art enabled the phantom principle to be extensively applied. Phantoming is used chiefly for toll and long distance lines. It is not applicable to common battery subscribers' circuits.

The Phantom Circuit—Cable.—For a number of years after the phantoming of open wires became practicable, the phantom principle could not be applied to wires in cables owing to the extent of the mutual interference between each phantom and its side circuits. It was only by specially twisting together two pairs to form a quad, and by refining every part of the manufacturing process, that a cable was produced sufficiently well balanced to permit good phantom operation. Quadded cables are now in extensive use in the United States, principally for interurban cables and for bringing phantomed open wire toll lines into large centres of population. For a time it was neither possible to phantom loaded lines nor to load phantom circuits. It was only after further refinements had been made in the electrical balancing of the coils that the advantages of loading could be applied to phantoms (both open wire and cable) not only by loading the physical circuits constituting the phantom but also the phantom circuit itself.

In 1918 engineers of the Bell System put into commercial service, between Baltimore and Pittsburgh, a multiplex system whereby four telephone conversations in addition to the one normally had (five in all) could be carried on over one circuit at the same time. By dropping out one of these telephone conversations, as many as 10 simultaneous telegraph messages might be substituted for it. The successful operation of this system depended on the ability to impart to the undulations of each added telephone conversation certain characteristics which permit each set of waves, at the receiving end of the line, to be directed into a particular channel. Five hundred channel systems are now in use.

This has been accomplished by superimposing the characteristics of each of the added sets of telephone waves (the frequency of which may vary from 200 to 2,000 alternations per second) upon a separate high-frequency current, called a carrier current.

New Developments.—In 1932 was introduced ship-to-shore telephony. Another development, in 1933, was 'conference service,' enabling men in various cities to hold business conferences by telephone. This was further supplemented by the use of loud speakers, allowing audiences to listen to conferences. Telephone communication from the U. S. was greatly extended to include Luzon, P. I., Jerusalem in Palestine, Bombay, India, and other foreign cities. In 1933 was perfected a stabilized feedback amplifier, by which the variations in current supply were reduced.

In 1941, the total number of telephones throughout the world was 44,189,669. Of these, the U. S. had 23,521,000. Next in number came Germany with 4,226,504, and Great Britain was third with 3,348,000. In 1936 the Bell Telephone Company laid a co-axial cable from New York City to Philadelphia which can transmit 240 telephone messages at once. The voices are reduced to radio frequencies, instead of electrical impulses as in ordinary telephone communication. Even when voices are sunk to a whisper almost no distortion is noticeable.

In 1942 a repeater equipment was developed that can be incorporated as part of a submarine cable and dropped to the bottom of the sea. This new repeater may lead to transoceanic telephony by way of cable. See Albert, *Fundamentals of Telephony* (1943).

Telephotography is the electrical transmission of pictures over telephone and telegraph lines, or by radio. Attempts at elec-

trical picture transmission were begun ninety years ago, almost immediately after Morse's success in telegraphy. From the beginning all efforts were directed towards developing the process along exactly the same lines as we know it today; that is, to obtain an electric current by means of a tracer responding successively to small areas of the original picture, to send this fluctuating electric current without distortion over the communication system, and to employ it at the receiving station to put down the point representations in their proper places on the recording sheet and thus reconstruct the picture. Yet, although the broad principles were recognized so long ago, and although several early devices embodied design features of permanent value, commercial application has come only within the last ten years. First there had to be perfection of methods for the faithful transmission of electrical signals to long distances; and that in turn awaited the development of special apparatus in the communication art, which has been so intensively developed within recent time.

Perhaps the most difficult part of the telephotographic problem has been the achievement of satisfactory recording means. Photographic methods, that is, those in which elementary areas of photographic paper are exposed to light in varying amounts corresponding to the signals transmitted by the photo-electric cells at the sending station, have the great advantage of requiring no mechanical moving parts, and are therefore most generally used in commercial installations. Besides the gaseous glow tube and 'light valve' systems already mentioned, various successful systems have made use of the Kerr cell and of the corona discharge from a Tesla coil in their recording apparatus. The disadvantage of photographic recording methods is that they require dark room or box operation, with no knowledge of the actual performance until the exposure of the completed picture is accomplished and it has been developed. Consequently a great amount of research work has been done on various visible methods of recording. Both hot air streams marking chemically treated heat sensitive paper and ink vapor streams marking plain paper have been used on commercial radio facsimile circuits with some success, the marking stream in each case being keyed by a small electrically deflected vane operated by the incoming picture signal. Good results have also been achieved with carbon paper, a moving stylus or bar being used to record

through the carbon sheet into the white paper beneath, and with chemically treated papers of various sorts.

There is a wide network of picture transmission circuits throughout Europe, England, the United States, and Japan, all over telephone lines, and radio telephotographic circuits have been operated from London to New York since May 1, 1926, and since at San Francisco and Honolulu, and by the Telefunken Co. between Buenos Aires and Berlin. The average time required to transmit a picture, including preparation and development at each end, varies from 30 minutes to one hour, depending on the size and difficulty of the subject. The manifold uses to which this commercial picture service is being put constitute a complete justification of the many years of concentrated effort on the part of thousands of investigators which were required to bring the art to its present practical state. New uses for telephotography are constantly coming up. The transmission of daily weather maps to airplanes, dirigibles, and ships in passage is an instance in point. Recently announced was a new radio facsimile system which reproduces entire messages, maps, and pictures directly on ordinary letter-sized paper at the rate of one sheet every eight minutes. It is not even beyond the bounds of probability that telephotographic methods may eventually be used for all wire and radio telegraph messages, thus eliminating the human element in recording incoming signals without recourse to telegraphic printer methods.

Consult H. E. Ives, *Transmission of Pictures over Telephone Wires* (*Bell System Technical Journal*, April, 1925); R. H. Ranger, *Photoradio Developments Proc. I. R. E.* (June, 1929).

Telescope, an optical instrument by which remote objects are brought apparently nearer. There are two kinds of telescope: in one, the rays from the object are made to converge by refraction; in the other, by reflection. The refracting telescope, invented in 1608 by Hans Lippershey, a spectacle-maker in Middleburg, Holland, was employed from 1609 in celestial observations by Galileo, Simon Marius, and Thomas Harriot. As originally devised it was a monocular opera-glass, composed of a convex and a concave lens fitted at opposite ends of a tube. In its modern form the dioptric telescope, described by Kepler in 1611, was first constructed by Father Scheiner. It consists essentially of a large convex lens of long focus, and a smaller convex lens or eye-piece of short focus, with which the real image formed in the focal plane of the 'objective' is magnified.

The invention of achromatic lenses, anticipated without being divulged by Chester Moor Hall of Essex, in 1733, was effectively realized by John Dolland in 1758. Owing to their unequal refrangibilities, the colored rays forming white light come each to a separate focus when transmitted through a simple convex lens. They yield, accordingly, a blurred and tinged image. Dolland, however, discovered that one kind of glass can be made to neutralize the dispersion of another kind, while leaving a balance of refraction, and he constructed object-glasses of a convex crown fitted to a concave flint lens, by which the main part of the incident light was brought to a common focus. Moreover, by skillfully compensating the opposite errors due to the curvatures of the glass surfaces, he succeeded in correcting spherical aberration as well, and thus, in principle, created the modern refractor.

The achromatism of refractors is imperfect, and the outstanding color or 'secondary spectrum' becomes more troublesome as aperture is increased. Its source is the chromatic 'irrationality' of flint and crown glass. The various colors are disproportionately deviated by the two media; consequently, only certain selected rays can be united by the compound lenses formed with them, the remainder showing as an obnoxious halo round the image. A photographic refractor has the object-glass so corrected as to unite the rays chemically most efficient. It is hence useless for eye observations. The eighteen telescopes with which the international survey of the heavens is being executed are of this type.

For the uses of exact astronomy, the refractor is unrivalled. It is recommended by its superior stability, definition, and adaptability to all forms of measuring apparatus. Moreover, in certain branches of photographic investigation requiring an extensive field of view, such as the picturing of the Milky Way, the combination of lenses known as a 'photographic doublet' is alone available. But in most departments of astrophysical research the reflector has undeniable prerogatives. It is, to begin with, perfectly achromatic. Light of all wave-lengths is concentrated by mirrors at a single focus. This is of peculiar importance in spectroscopy. Again, reflectors are cheaper to build and to mount than refractors. Further, the natural limit set to the size of refractors by the continually growing percentage of incident light lost in transmission through their lenses does not apply to reflectors. Reflective power per unit of area is the same for large as for small specula. Finally, the practical possibilities of development are in

their favor. The largest telescope mirror yet cast, 200 inches or nearly eighteen feet in diameter, was poured at Corning, N. Y., 1934. The finished mirror will be able to see four times as far into space as any telescope previously constructed. In April, 1936 this 20-ton disk of glass was safely transferred from the Corning Glass Works, to Pasadena, Cal., where a perfect paraboloid concavity was ground in its face. It was then moved to Palomar Mountain. In November, 1936, a telescope robot was perfected, which it is hoped will keep the cross wires of the telescope mechanically centered on the star image. See: *Amateur Telescope Making* (1935, 44th edition, Scientific American); E. A. Fath, *Through the Telescope* (1936); J. Stokley, *Stars and Telescopes* (1936); Albert G. Ingalls' *Amateur Telescope Making*.

Television means "seeing at a distance." In its most popular form, or telecasting, scenes or images are instantaneously flashed over the air to television receivers, with the sound accompaniment. Thus popular television is radio "hearing," plus *video* or "seeing," for pleasingly complete entertainment.

How It Works:—In the familiar sound broadcast, sound is converted into electrical voltage through the medium of the microphone. This conversion must be made, since it is impossible to broadcast sound in the form of sound over any great distance. Likewise in television, light cannot be broadcast as light, but must also be converted into electrical voltage. The television camera, in performing the conversion, corresponds to the microphone of sound broadcasting.

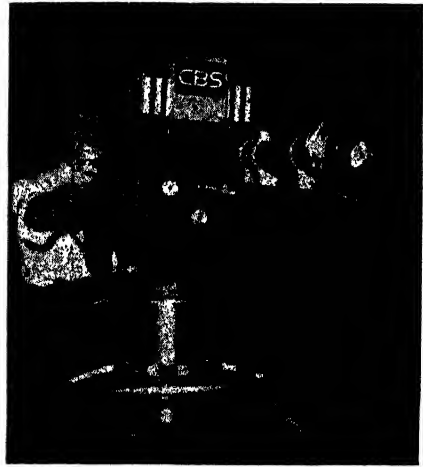
When a sound wave is converted by a microphone into equivalent electrical voltage, there is a continuous variation in the voltage from one instant to the next, because the sound impulses arrive at the microphone at different times and in different degrees of strength. Sound contains meaning by being continuous and varying, and the electrical voltage varies continuously with the sound.

However, in the case of light, the meaning of a picture (which is merely reflected light) is determined by the *arrangement* of the contents of the picture; this is a geometrical arrangement, whereas the meaning of sound is determined by the arrangement of the sound with respect to time. When a picture is presented for conversion into electrical voltage, the entire picture is presented at once, not individual parts in succession as in the case of sound.

Since a picture must be transferred into a

similar varying voltage, some means must be used to convert the picture areas into successive time intervals. The method for doing this is called *scanning*.

The TV Camera and How It Works:—The device used to scan the picture and to convert it into successive electrical impulses is the *camera picture tube* of image orthicon, with associated equipment. The image orthicon is a specialized type of cathode-ray tube. It contains an electron gun which generates and directs an electron beam at a photo-sensitive plate called a "mosaic," just as you would play a water hose on a wall. The electron beam and the picture for transmission may both be applied simultaneously to



Columbia Broadcasting Company

Television's Zoomar Lens. This lens permits going from long shots and wide angles to close ups and vice versa without switching cameras.

the mosaic. The picture for transmission is focused on the mosaic by an optical lens, identical with a camera lens. In effect, the mosaic and lens act as a camera, with the mosaic corresponding to the film.

The lens focuses the image being televised onto the mosaic. The nature of the mosaic is such that it will record the amount of light striking it and store up that information in the form of minute, discrete electrical charges distributed over its surface. In this manner the picture information is collected where it can later be removed by an electron beam and passed on to the following circuits of the television equipment.

through the carbon sheet into the white paper beneath, and with chemically treated papers of various sorts.

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Telescope, an optical instrument by which remote objects are brought apparently nearer. There are two kinds of telescope: in one, the rays from the object are made to converge by refraction; in the other, by reflection. The refracting telescope, invented in 1608 by Hans Lippershey, a spectacle-maker in Middleburg, Holland, was employed from 1609 in celestial observations by Galileo, Simon Marius, and Thomas Harriot. As originally devised it was a monocular opera-glass, composed of a convex and a concave lens fitted at opposite ends of a tube. In its modern form the dioptric telescope, described by Kepler in 1611, was first constructed by Father Scheiner. It consists essentially of a large convex lens of long focus, and a smaller convex lens or eye-piece of short focus, with which the real image formed in the focal plane of the 'objective' is magnified.

The invention of achromatic lenses, anticipated without being divulged by Chester Moor Hall of Essex, in 1733, was effectively realized by John Dolland in 1758. Owing to their unequal refrangibilities, the colored rays forming white light come each to a separate focus when transmitted through a simple convex lens. They yield, accordingly, a blurred and tinged image. Dolland, however, discovered that one kind of glass can be made to neutralize the dispersion of another kind, while leaving a balance of refraction, and he constructed object-glasses of a convex crown fitted to a concave flint lens, by which the main part of the incident light was brought to a common focus. Moreover, by skillfully compensating the opposite errors due to the curvatures of the glass surfaces, he succeeded in correcting spherical aberration as well, and thus, in principle, created the modern refractor.

The achromatism of refractors is imperfect, and the outstanding color or 'secondary spectrum' becomes more troublesome as aperture is increased. Its source is the chromatic 'irrationality' of flint and crown glass. The various colors are disproportionately deviated by the two media; consequently, only certain selected rays can be united by the compound lenses formed with them, the remainder showing as an obnoxious halo round the image. A photographic refractor has the object-glass so corrected as to unite the rays chemically most efficient. It is hence useless for eye observations. The eighteen telescopes with which the international survey of the heavens is being executed are of this type.

For the uses of exact astronomy, the refractor is unrivalled. It is recommended by its superior stability, definition, and adaptability to all forms of measuring apparatus. Moreover, in certain branches of photographic investigation requiring an extensive field of view, such as the picturing of the Milky Way, the combination of lenses known as a 'photographic doublet' is alone available. But in most departments of astrophysical research the reflector has undeniable prerogatives. It is, to begin with, perfectly achromatic. Light of all wave-lengths is concentrated by mirrors at a single focus. This is of peculiar importance in spectroscopy. Again, reflectors are cheaper to build and to mount than refractors. Further, the natural limit set to the size of refractors by the continually growing percentage of incident light lost in transmission through their lenses does not apply to reflectors. Reflective power per unit of area is the same for large as for small specula. Finally, the practical possibilities of development are in

their favor. The largest telescope mirror yet cast, 200 inches or nearly eighteen feet in diameter, was poured at Corning, N. Y., 1934. The finished mirror will be able to see four times as far into space as any telescope previously constructed. In April, 1936 this 20-ton disk of glass was safely transferred from the Corning Glass Works, to Pasadena, Cal., where a perfect paraboloid concavity was ground in its face. It was then moved to Palomar Mountain. In November, 1936, a telescope robot was perfected, which it is hoped will keep the cross wires of the telescope mechanically centered on the star image. See: *Amateur Telescope Making* (1935, 44th edition, Scientific American); E. A. Fath, *Through the Telescope* (1936); J. Stokley, *Stars and Telescopes* (1936); Albert G. Ingalls' *Amateur Telescope Making*.

Television means "seeing at a distance." In its most popular form, or telecasting, scenes or images are instantaneously flashed over the air to television receivers, with the sound accompaniment. Thus popular television is radio "hearing," plus *video* or "seeing," for pleasingly complete entertainment.

How It Works:—In the familiar sound broadcast, sound is converted into electrical voltage through the medium of the microphone. This conversion must be made, since it is impossible to broadcast sound in the form of sound over any great distance. Likewise in television, light cannot be broadcast as light, but must also be converted into electrical voltage. The television camera, in performing the conversion, corresponds to the microphone of sound broadcasting.

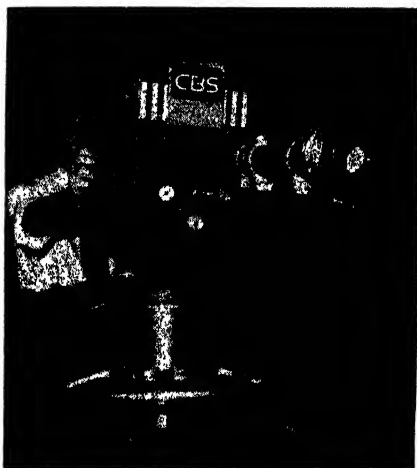
When a sound wave is converted by a microphone into equivalent electrical voltage, there is a continuous variation in the voltage from one instant to the next, because the sound impulses arrive at the microphone at different times and in different degrees of strength. Sound contains meaning by being continuous and varying, and the electrical voltage varies continuously with the sound.

However, in the case of light, the meaning of a picture (which is merely reflected light) is determined by the *arrangement* of the contents of the picture; this is a geometrical arrangement, whereas the meaning of sound is determined by the arrangement of the sound with respect to time. When a picture is presented for conversion into electrical voltage, the entire picture is presented at once, not individual parts in succession as in the case of sound.

Since a picture must be transferred into a

similar varying voltage, some means must be used to convert the picture areas into successive time intervals. The method for doing this is called *scanning*.

The TV Camera and How It Works:—The device used to scan the picture and to convert it into successive electrical impulses is the *camera picture tube* of image orthicon, with associated equipment. The image orthicon is a specialized type of cathode-ray tube. It contains an electron gun which generates and directs an electron beam at a photosensitive plate called a "mosaic," just as you would play a water hose on a wall. The electron beam and the picture for transmission may both be applied simultaneously to



Columbia Broadcasting Company

Television's Zoomar Lens. This lens permits going from long shots and wide angles to close ups and vice versa without switching cameras.

the mosaic. The picture for transmission is focused on the mosaic by an optical lens, identical with a camera lens. In effect, the mosaic and lens act as a camera, with the mosaic corresponding to the film.

The lens focuses the image being televised onto the mosaic. The nature of the mosaic is such that it will record the amount of light striking it and store up that information in the form of minute, discrete electrical charges distributed over its surface. In this manner the picture information is collected where it can later be removed by an electron beam and passed on to the following circuits of the television equipment.

The Light-sensitive Mosaic:—The structure of the mosaic, located within the camera picture tube, includes a photosensitive material deposited on a mica plate, in the form of thousands of cells insulated from one another. A signal plate is mounted on the opposite side of the mica and is thus capacitatively coupled to each of these cells. When light is admitted through the lens, each cell loses electrons which are attracted to the positively charged metallic coating on the inside wall of the picture tube, called the "collector ring." As a result, each cell is charged positively with respect to its equilibrium potential.

At this point complete picture information is contained in the charges of the mosaic, just like complete picture information is contained in each grain of the chemical coating of a film when the camera lens is opened. In the case of television, however, the information exists in the form of electrical charges. A process analogous to developing a film is performed on the mosaic by the electron beam of the picture tube. This is known as *scanning*.

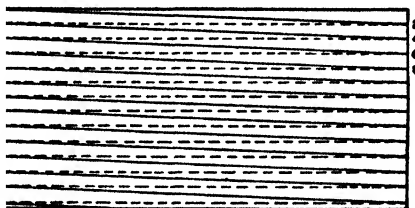
The Meaning of Scanning:—Now in scanning, the electron beam of the picture tube is moved in a fixed, repeated path over the area of the mosaic. As the electron beam strikes each of the charged cells of the mosaic, the electrical balance of each cell is returned to neutral. The scanning operation produces a series of voltage variations corresponding in magnitude to the light intensity applied to each cell. The light intensity applied to each cell obviously varies from cell to cell because of the way in which a natural object, with its variety of surfaces and planes, reflects light. Thus from cell to cell there will be a variation in the magnitude of charge, just as there is a variation in the light and shade qualities of an object from one area to another.

The voltage variations produced by the scanning process thus become the electrical equivalent of the picture. This picture can be reproduced on an ordinary cathode-ray or receiver picture tube. If this cathode-ray tube is connected so that its electron beam is caused to sweep across the screen in precisely the same way and in step (synchronism) with the beam of the camera picture tube, a rectangle of light will be observed on the screen. This light rectangle is called a *raster*. The raster serves as a frame or surface on which the picture is to be reproduced. The more positive the voltage applied to the cathode-ray tube, the higher becomes the raster.

Thus, since the picture signal is made up of impulses of varying degree of positive value,

it will cause the raster to become brighter with more positive impulses and darker for the less positive impulses. Since the sweep of the cathode-ray tube is synchronized to that of the camera picture tube, the light and dark of the image on the mosaic will be reproduced on the cathode-ray tube.

The technique of scanning employs two separate *sweep circuits* to deflect the electron beam along a horizontal and vertical path. While any regular path could be followed which traversed the whole image area, a straight-line scanning path is usually employed. As shown in the accompanying dia-



Simple straight-line scanning.

gram, the electron beam is swept from point 1 across the image area to point 2, and then from point 3 to point 4, etc., the scanning path being the resultant of the horizontal and vertical deflections. The present standard scanning pattern consists of 525 horizontal sweeps of the electron beam while moving from top to bottom of the image area in $\frac{1}{60}$ th of a second.

Interlaced Scanning:—In actual practice, so-called *interlaced scanning* generally is employed. In interlaced scanning, as shown in



Interlaced scanning.

the accompanying sketch, the beam is swept from point 1 to point 2, as before, but the

second sweep is from point 5 to point 6, the line 3-4 being skipped. On reaching the bottom line of the raster, the beam returns not to the 1-2 line but rather to the 3-4 line, and it then sweeps the 7-8 line. In the interlaced method, half the lines are swept from top to bottom of the raster, and then the other half are swept. The object of interlacing is to reduce or eliminate the picture flicker.

At the receiving end there is a picture tube corresponding to the iconoscope or image orthicon at the camera end. The same pattern of scanning is followed. Separate sweep circuits, in step with the camera sweep circuits, drive the cathode-ray beam. A fluorescent coating at the end of the tube glows upon the impact of the cathode-ray beam, in intensity determined by the received signal. With no signal on the grid, a uniform rectangle of light, or raster, is produced.

Synchronization of the sweep circuits of camera and receiver is accomplished by the use of *synchronizing pulses*. But now we are getting really too technical for a popular understanding of television. Especially so since today's television receiver is packaged merchandise, readily installed and operated without need of technical skill except in its servicing.

With Camera and Microphone:—To understand television show production, it is necessary to bear in mind that we are dealing with *simultaneous happenings*, unless it be a film program. In other words, the image picked up is of the very moment, and not like movies or phonograph records which can be separated in time between recording and reproduction, with all the flexibility and convenience which such time-delay means will allow.

Thus the TV cameraman must know how and what to pick up with his lens. For even the simplest studio production, there must be two or three TV cameras so as to go from one angle to another, and especially from one scene to another. To co-ordinate the pickups of a plurality of cameras, there must be supervision and direction provided by the production manager in the control room who sits before monitors whose TV screens reproduce precisely what each camera is picking up at the given moment. Then, by means of an intercommunicating system, with cameramen, microphone boom operators, electricians and others, each wearing tiny earphone and microphone harnesses, all activities can be blended for the desired result. Engineers at the console adjust the light level and contrast

of the camera image, blend from one scene to another and even superimpose different scenes for impressive photo montages, or switch from one scene to the next, while the studio crew follow the 'phoned orders of the production director.

From the control console the selected image and sound go to the master control for final checkup, and then to the local transmitter or, in the case of a network, over coaxial cables or radio relay to remote transmitters.

Television Range:—Theoretically speaking, the transmitting range is held to be limited to actual "line of sight" between transmitting and receiving antennas. That is why it is so desirable to have a lofty transmitting antenna, and a correspondingly high receiving antenna where feasible. In practice, however, the "line of sight" limitation does not hold true. Good TV reception is being enjoyed even when tall buildings, hills and other obstructions intervene between transmitter and receiver. In the case of the Empire State Building with its new TV tower reaching up to almost 1500 feet above sea level, there is a good TV service area of 50-mile radius, with another 25 to 35 miles of fringe area calling for more elaborate receiving antennas. Five of New York's seven TV stations had their transmitting antennas atop the Empire State Building early in 1951. In other localities suitable altitude was obtained either with tall buildings or by taking advantage of high terrain.

The Television Industry:—As of the beginning of 1951, there were about 11,500,000 television sets installed and in operation in American homes and public places. These sets were served by a total of 107 TV stations located in areas representing better than 60 per cent of the nation's population. In 1950 alone, some 7,500,000 TV sets were produced, but with the military preparedness program in 1951 TV-set production was bound to taper off. The 1950 production represented a total of 2½ billion dollars at retail, while the telecasting revenue was estimated at \$100,000,000.

Television Networks:—The prime factor in justifying extraordinary programs has been the steady growth of TV networks. Of the 107 stations on the air at the beginning of 1951, 79 were interconnected by coaxial cable or micro-wave relay in sharing network programs, while 28, not so interconnected, enjoyed big-time programs by means of tele-transcriptions (off-screen movie recordings) and even by special TV movie productions. Much of the eastern half of the country was

already joined together by coaxial cable and radio relay. The AT&T radio-relay system between New York and Chicago, built at a cost of \$12,000,000, represented the longest chain of radio-relay stations in the world with the 838-mile route spanned in 34 hops of about 25 miles each. The radio-relay network was extended to Omaha, a further distance of 458 miles. Construction of the Omaha-Denver section was scheduled for early operation. Tests between Denver and the West Coast were finished, and radio-relay stations under construction were soon to bridge the intervening mountain ranges. Coast-to-coast networks were not far off.

Television Receivers:—The trend toward larger screen sizes continued. The majority of the earlier TV sets featured 7" tubes, but the public soon tired of "seeing the game through a knothole." The 10" tube size was popular for a couple of years, because of economic considerations, but was duly displaced by the 12", followed by the 15", 17", and 19". The Du Mont 30" round tube, demonstrated during 1950, met with such unexpected acceptance that it was expected to be available shortly for home quite as well as public use.

The rectangular-shaped tube had been gaining in popularity, because of its space-saving feature, making for more compact cabinets. The rectangular size indication, such as 17" rectangular, means the *diagonal dimension*—from corner to corner—and not the width.

The cost of TV receivers continued to drop, due mainly to simplification of circuits and cutting down from an average of 30 tubes to 21 or 22. Prices rose slightly in the fall of 1950 because of material and labor cost increases, followed by the Federal Excise Tax of 10 per cent on manufacturer's factory price, passed on to the consumer. Including proper installation, the 1950 average was \$350. However, cost is bound to rise with the growing scarcity of manpower and materials created by the rearmament program.

Color Television:—That there should be much confusion with regard to color television, goes without saying. Everything else being equal, color pictures are certainly far more desirable than those in black-and-white. However, everything else is far from being equal, and thereby hangs great misunderstanding.

In October 1950 the FCC (Federal Communications Commission) announced its endorsement of the CBS color system for the television industry. Reached after months of study of the three TV color techniques

reviewed by the Commission—RCA, CTI and CBS—the decision was made despite the fact that the CBS system is *not compatible* (not interchangeable with black-and-white TV signals received by millions of sets in use). It represents a method that has been in existence as a novelty for years. Picture frames are traced on the screen in succession as they are in black-and-white television. The difference lies in the fact that with the CBS system no one of these images is complete in itself. Each contains only the elements of the scene of one particular color. It takes three of these images traced rapidly in succession to complete a scene. The first one traces all the red portions of the scene, the second all the blue portions, and the third all the green-yellow portions. Colors are not produced by the picture tube, but are the result of viewing the scene through a transparent colored disc made up of red, blue and green-yellow segments rotated by an electric motor.

Other color television systems, particularly the recently demonstrated RCA color technique, do away with the revolving color wheel. The color is contained within the cathode-ray tube or tubes, so that mechanical means are dispensed with. Also, such electronic (vs. mechanical) systems are compatible, which means that their color signals can be tuned in and reproduced by standard and existing TV receivers in black-and-white, while they are being enjoyed in color by color TV sets or converted standard sets.

Color television? Eventually, yes. But a tremendous amount of development, let alone working out production details and the economics thereof, remains to be done between a satisfactory laboratory demonstration and a color TV set in the average home. New ultra-high-frequency channels may be required to accommodate color television as well as many more black-and-white TV stations so as to provide *more areas with more program choice*. Much engineering remains to be done, much of it by the trial-and-error method of actual experience, in the matter of exploiting those ultra-high-frequency channels.

Industrial Television:—Color television is proving immediately practicable for private, closed-circuit, nonentertainment purposes. Freed from the restrictions on radioed television, the so-called industrial version becomes a matter of compromising desired quality with cost limitations. My own organization has introduced a packaged, ready-to-operate, practical color TV system which

is finding ready applications in merchandising, medicine, research, management and other fields. Aimed at any given scene, the Du Mont color camera transmits signals over direct cables to one or more remote color receivers or monitors which reproduce the scene in full color and with fine detail. A typical usage is the bringing of latest surgical skills from the privacy of the operating room to another part of the hospital where an unlimited audience can follow the intimate surgical details in comfort and freedom. Another usage is by the research worker who, without slightest danger or inconvenience, can now transfer his eyes—and ears—to the very midst of the most hazardous experiment or test. If color is non-essential, there is black-and-white industrial television featuring compact, light-weight cameras and associated equipment. A recent development is stereoscopic television, with the third-dimensional effect, so that delicate operations such as precise manipulation of the mechanical hands used in handling hazardous atomic materials from a safe distance, are readily effected.

DR. ALLEN B. DU MONT,
*President, Allen B.
Du Mont Laboratories, Inc.*

Tell, William, hero, Swiss legend relates that, refusing reverence to Austria, (1407) in Altorf market-place, Tell was sentenced to death unless he shot an apple placed on his son's head. This feat he accomplished, but confessing that a second arrow was kept in reserve for the Austrian bailiff, if he had killed his son, Tell was seized and carried to the tyrant's boat, but a storm arising, was released that he might act as pilot. On reaching shore he shot his enemy and escaped. This shooting was the signal for a rising, resulting in Swiss confederation.

Tell-el-Amarna, ruined city on the Nile, Middle Egypt, between Memphis and Thebes. Ruins of the temple and palace, founded by Amenophis IV., clay tablets with cuneiform inscriptions containing Egyptian correspondence with Babylonia, Assyria, and other Eastern nations, and several groups of rock tombs have been discovered.

Tellurium, Te, 127.5, is a rare semi-metallic element of the sulphur group, and is chiefly found as a gold telluride, and in some copper ores. It is of grayish-white metallic appearance, of specific gravity 6.2; melts at 450° C.; boils at 1,390° C.

Telpherage, a system of traction by aerial

rope or wire way used for the conveyance of minerals over rough country, in which a stout steel cable supported on poles forms the track. On this are suspended little trolleys with the wheels running on the cable. A second cable conveys current to the trolley, and the lower cable acts as the return conductor. A small motor drives the trolley. The arrangement may be automatic, but sometimes the train is large enough to carry a driver. In World War I the Italian army developed a telpherage system to carry guns, munitions and men up the steep mountain faces of their battle front.

Telugu, a language of South India, spoken by about 23,600,000 people, who are spread over Orissa almost down to the city of Madras. Telugu, like all other languages of the Dravidian family, is an agglutinative language, particles being 'glued on' or prefixed, suffixed, or infixes, to words or roots in order to express grammatical relation.

Temesvar, now Timisoara, city, Rumania in Temes Co.; 240 m. n.w. of Bucharest. Features of interest are the castle founded 1443, the Roman Catholic cathedral, founded 1736-57, and a memorial column to its defenders. It at the close of the Great War became a part of Roumania; p. 91,000.

Tempe, a beautiful valley in northern Thessaly, Greece, between Mount Olympus and Mount Ossa, through which the river Peneus flows into the Gulf of Saloniki.

Tempera, in art, a method of painting in which the pigments are mixed with chalk or clay and diluted with weak glue or size. It is used chiefly for mural decoration and scene painting.

Temperament, in music, is a term applied to the system of compromise adopted in the tuning of keyboard instruments. In natural or just intonation, intervals of tones are not all of equal size, and certain notes when sounded simultaneously must be slightly altered from their original pitch in relation to the tonic in order to produce perfect concords. Therefore were an instrument of fixed pitch tuned to just intonation in any one key, it would not be absolutely in tune in all chords in that key, and would be much less in tune in any other key; but by tempering all the intervals of a scale—with the exception of the octave—so as to deviate slightly from just intonation, a keyboard instrument can be made approximately in tune in all keys. By this method—termed 'equal temperament'—the octave is divided into twelve semitones of practically equal size, and this system of tuning has been universally adopted for all instruments with

fixed tones. Previous to this the *meantone* system, limited to a few keys, was used.

Temperance and the Temperance Movement. A movement to control the use of intoxicating liquor. In modern times the development of the temperance movement is best illustrated in English-speaking countries, especially in the United States, where the results have been more noteworthy than in many other countries.

Local temperance societies were organized in the New England States, Pennsylvania, and New York, and in 1826 was founded the first national organization, the American Temperance Union, and still later (1865) the National Temperance Society and Publication House. The British and Foreign Temperance Society was formed in 1831. One of the pioneer workers in Great Britain was Father Theobald Mathew.

After the outbreak of World War I, the temperance movement made remarkable headway. The Secretary of the U. S. Navy issued an order which prohibited the use of alcoholic liquors on board naval vessels or in navy yards; many railroads stopped serving liquors on their trains, and prominent industrial concerns prohibited the use of liquor among employees. The first definite forward step in the movement to obtain temperance by legislation was the adoption of a State local option measure by Maine (1846), but the temperance leaders finally came to the conclusion that local option was practically a failure, and turned their efforts to prohibition. For a history of this movement, see PROHIBITION.

In other countries the tendency has been toward moderation rather than total prohibition. In Canada the many temperance societies did much to mould public opinion in favor of prohibition, but prohibitory laws have been repealed throughout the country except in the maritime provinces. Moderation is encouraged, and alcoholic drinks are sold under government supervision. A somewhat similar system prevails in Norway. In Russia the manufacture and sale of vodka was stopped in 1914, but the Soviet government granted a return to a completely wet basis in 1925. The experience of the United States, Canada, and Norway with prohibition is not unqualifiedly encouraging, and in the general trend would seem to be against hastening the trial of expedients which are likely to react against individualism and political liberty.

See ALCOHOL; ALCOHOLISM; INTOXICATION; LOCAL OPTION; PROHIBITION.

Temperature, in physics, is that quality of bodies which depends upon the quantity of

heat concentrated in them. In order to get exact and quantitative ideas of temperature various changes in the properties of bodies must be studied. Of these the change in size is most commonly made use of—most substances, whether solid, liquid, or gas, expanding when heated. Most thermometers depend on the measurement of the size of the particular quantity of mercury contained in them. The change of state of substances, as it takes place at definite temperatures, is also employed as a means of measurement. Thus the standard unit of temperature commonly employed is the range between the melting-point of ice and the boiling-point of water, this unit being divided into 100° on the centigrade and 180° on the Fahrenheit scale. See PYROMETER; THERMODYNAMICS; THERMOMETER.

Temperature, in meteorology, refers to the condition of the atmosphere in relation to heat and cold. Since practically all of our heat comes from the sun, we may expect the temperature of any locality to depend primarily upon the season of the year, and distance from the equator. But modifying influences, such as altitude, the direction of the prevailing winds, and the extent, proximity, and relative position of areas of land and water, prevent a simple and regular distribution of temperature in conformity with the latitude, and not infrequently bring to places several degrees apart climates equally mild or equally severe. The sea is heated and cooled much less than the land in the same latitude, and shows a much smaller range of temperature, either from day to night or from summer to winter. The range of temperature—the difference between the highest and lowest—is, as we might expect, least in localities subject to oceanic influences, and greatest in the interior of continents, especially in arid and plateau regions, whose clear, dry atmosphere is favorable to radiation. Such part of the solar radiation as is not lost into space by reflection, or absorbed by the atmosphere before it reaches the earth, heats the surface of the latter, and is again radiated, but now as heat of a different quality from the solar rays, for the most part of longer wave length, more readily absorbed by the atmosphere, and hence of greater effect in raising its temperature. But a probably more important source of heat is by conduction from the hot soil to the air in contact with it. As the latter is heated it becomes specifically lighter and rises to give place to the colder layers above. After sunset the rapid loss of heat by radiation brings the temperature of the ground below that of the superincumbent air, which

is in turn cooled by conduction and radiation to the earth.

The highest temperature of the day occurs about 3 P.M., the lowest about sunrise. The difference between the two, sometimes 40° or more at the earth's surface, diminishes as we recede from its influence, until we find in the upper levels a stratum whose temperature remains nearly constant throughout the twenty-four hours.

The highest temperature of official record in the United States is 122° in Death Valley, Cal. The extreme minimum in this country is 65° below zero in Montana, and about 90° below zero at Werchojansk, in northeastern Siberia, perhaps is the world's record. Many recent attempts have been made to approximate absolute zero, a temperature of -273.13 degrees Centigrade, at which the motion of molecules would cease. In February, 1935, Professor W. J. de Haas of the U. of Leyden, Holland, announced that by means of a magnetic compound containing potassium, chromium, and alum, he had attained a temperature .0002 degrees Centigrade above absolute zero.

See HEAT; THERMODYNAMICS.

Templars, a military order, founded in 1119, at the time of the crusades, by Hugues de Payen and Godfrey de Saint Adhémar, with seven other knights, taking on themselves the vows of chastity, poverty, and obedience, and undertaking the defence of pilgrims to the holy places. By Baldwin II, king of Jerusalem, they were granted quarters in his palace, built on the site of the Temple: hence the name of the order. At first none but nobles or knights were admitted, but subordinate members were allowed as the order grew great and wealthy. It was governed by a grand master, who had his seat first at Jerusalem.

The active history of the Templars is the history of the crusades. Twenty thousand Templars perished in the attempt to hold the holy place of the Christian religion for Christendom, and most of their grand masters died on the field of honor or from wounds received in battle. At last Philip of France, cast greedy eyes on the treasures possessed by the Templars, and directed the pope, Clement V., to summon the grand master to appear before him. The grand master, Jacques de Molay, answered the summons, and on Oct. 16, 1307, he and 140 Templars were seized and thrown into prison. Torture was freely used. Many Templars were burned to death. Their property was confiscated and handed over to their bitter enemies, the Hospitallers. The annual

income drawn from their European possessions alone is estimated to have been about six million pounds sterling. The Templars, moreover, possessed many privileges above ordinary Europeans. But the main cause of their overthrow was undoubtedly the dangerous position which they occupied in the political life of Europe.

The Knight Templars of Freemasonry, although a comparatively modern institution, represent a certain phase of the great historical organization, which was to some extent a secret fraternity. (See FREEMASONRY.)

Template, or **Templet**, the outline of something to be constructed, made in thin wood or metal, to serve as a pattern.

Temple. In the history of Israel three buildings of different eras bore the name Temple. (1.) Solomon's Temple was one of a group of buildings on Mount Moriah (or Zion), the modern Haram-es-Sherif. Its artificers were Tyrian workmen, and it was probably constructed after Phœnician or Syrian models. The temple was pillaged and burned at the siege of Jerusalem under Nebuchadnezzar (588 B.C.), having stood for some 418 years. (2.) The Temple of Zerubbabel was founded 534 B.C., then compulsorily abandoned; resumed in 520, it was completed in 516. It stood on the site of the former, but was inferior both in magnitude and in splendor. Pompey damaged it in 63 B.C., and Herod the Great inflicted further injury in 37 B.C. (3.) The Temple of Herod was begun about 20 B.C. This is the temple of the New Testament, associated with Jesus and His disciples. It was destroyed by fire in the siege of Jerusalem in 70 A.D. A splendid Mohammedan mosque now occupies its place.

Temple. See **Inns of Court**.

Temple, Frederick (1821-1902), archbishop of Canterbury, was born in the Ionian Is. In 1858 he accepted the headmastership of Rugby, and during this period proved himself an ardent partisan of Gladstone. In 1867 he roused fierce opposition by his essay, 'The Education of the World,' published in *Essays and Reviews*. In 1869 he became bishop of Exeter, and in 1885 was appointed bishop of London. Temple, in 1896, succeeded Benson as archbishop of Canterbury, and proved himself a forceful administrator.

Temple, Shirley (1929-), motion picture actress. At two years of age she was entered in a dancing class. Here she was selected to appear in a series of films called *Baby Burlesques*. Then she appeared in *Frolics of Youth*, *Bright Eyes*, *The Little Col-*

onel, Our Little Girl, Curly Top, The Littlest Rebel, Captain January, etc.

Temple, William, Archbishop of Canterbury (1881-1944), was born in Exeter; educated at Rugby and Baliol College, Oxford; taught philosophy at Oxford (1904-10); Archbishop of York (1929-42); Archbishop of Canterbury (1942-44). He espoused the miners' cause in the 1926 strike. Author of *Christian and Social Order* (1942).

Temple, Sir William (1628-99), British diplomatist. His most famous work was the negotiation of the 'Triple Alliance' of 1668, between England, Holland, and Sweden. Temple was afterwards ambassador at The Hague, negotiating the marriage of William of Orange with the Princess Mary.

Temple Bar, the last of the old City of London barriers, was pulled down (1878) as an obstruction to traffic, and replaced by a monument. Temple Bar was built by Wren (1670). The closing of its gates announced the sovereign's entry into the city. It was re-erected at Theobald's Park, near Waltham Cross, in 1888.

Temple University, nonsectarian institution in Philadelphia, opened in 1884 as a night school. Power to confer degrees was granted in 1891, when a day department was opened. Theological, law, and medical schools were subsequently added.

Temporal Power. See **Papacy**.

Temuco, town, Chile, capital of Cautin province, 80 m. n.n.e. of Valdivia, on the Cautin R. The leading manufactures are leather and malt; p. 28,546.

Ten, The Council of, a magistracy appointed in 1310 by the Venetians to act as a prompt and secret executive in affairs of emergency. It absorbed all private and urgent executive business—foreign policy, censorship of morals, and trial of state cases. Its mysterious secrecy and its ruthless promptitude made it a terror to all offenders.

Tenacity, in strength of materials, is the least longitudinal pull which will cause a bar of unit section to rupture. It is commonly estimated in tons per square inch or kilograms per square centimeter. See **ELASTICITY** and **STRENGTH OF MATERIALS**.

Tenant. See **Landlord and Tenant**.

Tenants in Common. Two or more persons owning definite undivided interests or shares in real or personal property. This form of tenancy always arises where two or more heirs inherit property.

Tenasserim. The southernmost division of Burma, lying between the Indian Ocean

and the mountains of the Siamese frontier. Area, 36,730 sq. m.; p. 160,000.

Ten Brink. See **Brink**.

Tench (*Tinca vulgaris*), a fresh-water fish of the carp family, found all over Europe in standing water, especially where the bottom is muddy.

Tender. In law, an offer by a person to pay a debt, or perform some obligation, as to convey property or deliver goods. Tender must be unconditional, or with proper conditions, and if in money, must be in coin or currency known as legal tender. Government notes are legal tender except for duties, etc., and interest on public debt; gold and silver certificates and national bank notes are legal tender with above exceptions.

Tendon of Achilles, the tendon which connects the heel with the calf of the leg, and is the principal extensor of the foot. It is so called because, according to fable, the mother of Achilles, when she dipped him in the river Styx to make him invulnerable, held him by the heel, and thus the heel was the only part of him which remained vulnerable.

Tendons, in anatomy, are white, glistening, non-elastic cords, or bands, composed of white fibrous tissue, the fibrils of which are parallel and firmly united together. They are almost devoid of blood-vessels and nerves, but are sometimes provided with synovial sheaths. Tendons serve as connecting bands between muscles and the structures upon which the muscles act.

Tendrill, the name given to leafstalks which are so modified as to form twisting threads whereby certain plants cling to other plants or to supports.

Tenedos, island in Aegean Sea, off coast of Troas in Asia Minor, the station of the Greek fleet during the siege of Troy. In later times it was famous for its wine and pottery.

Tenerife, or **Teneriffe**, **Peak of** (*Pico de Teyde*), a dormant volcano, island of Tenerife, forming the highest summit (12,180 ft.) in the Canary Islands. The summit is snow clad. The last outbreak was in 1798; and in the year following Humboldt and Bonpland made their famous ascent. The island is treated under **CANARY ISLANDS**. See C. Piazzi Smyth's *Teneriffe* (1858).

Teniers, David, the elder (1582-1649), Flemish genre and landscape painter, studied under Rubens. *A Dutch Kitchen* and *Templation of Saint Anthony* are in the Metropolitan Museum, New York.

Teniers, David, the younger (1610-90), the foremost Flemish genre painter of peasant

life, of the alehouse and the card-table, son of David Teniers the elder (1582-1649), who was his first master. Several of his paintings are in the U. S.—a *Marriage Festival* and *Judith* are in the Metropolitan Museum, New York, while his *Parable of the Laborer*, *Incantation Scene*, *Village Fete*, and several others are in the rooms of the New York Historical Society.

Tennant, William (1784-1848), Scottish poet, was born a cripple at Anstruther, in Fifeshire. He became a clerk, and later schoolmaster at Dunino, Lasswade, and Dollar. Tennant's knowledge of Hebrew, Arabic, and Persian gained for him the chair of Oriental languages at St. Andrews University in 1834.

a general elevation of about 5,000 feet, with a score of peaks exceeding 6,000 feet. Much of this mountain area is included in the Great Smoky Mountain National Park project.

The climate of Tennessee is notably pleasant. The temperature varies little from one part of the State to another; though it is somewhat cooler in the mountains of the east. The mean annual temperature for the State is 58° F.; the mean winter temperature is about 38°; the mean summer temperature about 65°. The mean annual precipitation is about 54 inches, equally distributed over the State.

For the most part, the soils are either allu-



Lookout Mountain, as seen from the City of Chattanooga, Tennessee.

His *Anster Fair* introduced to England the form of verse used by some Italian poets. This was later used by Byron in *Beppo* and *Don Juan*.

Tennessee (popularly known as the 'Big Band State'), one of the South Central States of the United States, bounded on the n. by Kentucky and Virginia; on the e. by North Carolina; on the s. by Georgia, Alabama, and Mississippi; and on the w. by Missouri and Arkansas. The Mississippi River marks all of the western boundary. The total area is 42,022 sq. m., of which 335 are water surface. Along the eastern border of the State extend the Unaka or Great Smoky Mountains, with their continuations, the Bald, Iron, and Unico. The Unaka range has

vial deposits, found especially along the Mississippi, or formations of eroded and weathered limestone occurring throughout the central parts and in the river valleys of the eastern part. An area of sandy loam occurs west of the Tennessee River. The oldest formations in the State are in the Unaka Mountains, in the s.e. corner, composed of cores of Archæan metamorphic rocks surrounded by sandstones of the Cambrian, and limestones and shales of the Lower Silurian epochs.

Tennessee ranks high in marble products, phosphate rock, pyrites, and zinc. Coal and other minerals are also important.

The forests of Tennessee are extensive. Along the ranges of the east grow conifers,

while the remainder of the State is heavily forested with oak, yellow pine, gum, poplar, chestnut and hemlock. The fertile soil produces corn, cotton, tobacco, hay, grains, potatoes, and other crops.

The manufacturing industries of Tennessee are based largely upon its rich natural resources. They produce textiles, lumber and timber products, flour and other grain-mill products, steam railroad construction and repairs, feeds, motor vehicle bodies and parts, chemicals.

The population of Tennessee is 3,291,718. Of this total, foreign-born whites number 15,065; Negroes, 530,603; Chinese, 230; Japanese, 104; and Indians, 339. The urban population, in towns and cities of at least 2,500 population, represents 38.4 per cent of the total. The population of the principal cities: Memphis, 396,000; Nashville, 174,307; Chattanooga, 131,041; Knoxville, 124,769; Johnson City, 27,864; Jackson, 30,207; Kingsport, 19,571; Bristol, 16,771.

Tennessee has a State Department of Education of nine members, appointed by the governor. There is a Commissioner of Education. Separate schools must be maintained for white and colored children. Education is compulsory for children from seven to sixteen years unless high school grade has been reached. Schools must be open at least eight months each year. Institutions for higher education under State control, in addition to teachers' colleges, are the University of Tennessee at Knoxville, and Tennessee Polytechnic Institute, at Cookeville. Under private control are Fisk University for colored students, and Vanderbilt University, both at Nashville; Southwestern Baptist University, at Jackson; University of the South at Sewanee; Cumberland University, at Lebanon; Tusculum College, at Greeneville; and the University of Chattanooga, at Chattanooga.

Tennessee has a State Department of Institutions, which has charge of charities and corrections. The present constitution of Tennessee was adopted in 1870. Only one amendment every six years may be proposed. Payment of the poll tax and residence in the State one year and in the county six months are prerequisites of voting.

The chief executive officers are the Governor, elected for two years; the Secretary of State, Treasurer, and Comptroller, chosen by the legislature for two years; and the Attorney-General, chosen by justices of the Supreme Court for eight years. The legislature, called the General Assembly, convenes

in January of odd years. The judicial authority is vested in a Supreme Court of five justices, elected for eight years; in a Court of Civil Appeals of nine judges, elected for eight years; in Circuit and in Chancery Courts, the judges of which are elected for eight years by the electors; and in Probate Courts and Justices of the Peace. Under the Reapportionment Act of 1929, Tennessee has 10 Representatives in the National Congress. Nashville is the State capital.

In April, 1541, De Soto reached the Mississippi River at the present site of Memphis, Tenn. In 1756 the English established Fort Loudon, about thirty miles from the present Knoxville. A series of permanent settlements were begun in 1769 by colonists from Virginia and North Carolina. In 1776 this section became part of North Carolina, as the County of Washington. The first territorial legislature met in 1794; a constitutional convention was held in 1796; and on June 1, 1796, Tennessee became a State. At the outbreak of the Civil War, a majority of the people were opposed to secession, but after Lincoln's call for troops, an ordinance of secession was adopted by popular vote (June, 1861). Reconstruction was begun in 1865 by amendments to the Constitution providing for the abolition of slavery. During the same year the ordinance of secession was repealed, and the Confederate war debt repudiated. Tennessee was re-admitted to the Union on July 24, 1866. During this year the Ku-Klux-Klan is said to have originated within the State. In 1882 the old State debt was finally compounded at fifty cents on the dollar. During the first quarter of the 20th century, Tennessee passed a volume of social legislation. In 1933 the Tennessee Valley Authority was organized by the Federal Government, with headquarters at Knoxville, for the purpose of providing flood control, agricultural and industrial development, conservation measures such as reforestation and prevention of soil erosion. The Authority culminated a six-year-old fight with power interests in 1939 when it acquired complete control of all electric power in Tennessee by purchasing the Tennessee Electric Power Co. for \$78,425,095. For general information consult W.P.A. Writers' Project, *Tennessee* (1939). See TENNESSEE RIVER.

Tennessee Centennial Exposition was held in Nashville, Tenn., from May 1 to Oct. 30, 1897, to celebrate the hundredth anniversary of the admission of the State to the Union. The reproduction of the Parthenon,

the Pyramid of Cheops (Memphis Building), the Alamo (Texas Building), the Administration Building of the World's Columbian Exposition (Illinois Building), and the Rialto at Venice were noteworthy architectural features.

Tennessee River, the largest branch of the Ohio River, is formed in Tennessee by the junction of five smaller streams. It flows s.w. then n.w. through Tennessee, into Alabama, then across Tennessee and Kentucky. The drainage basin is 39,000 sq. m. and the total length to the source of the Holston, 1,200 m. The potential power development of this river system is estimated at about 1,000,000 horse power, of which only 85,000 horse power had been developed in 1932. The Tennessee Valley Authority, established in 1933, has for its goal flood control, navigation, and generation and sale of electric power. The United States Government built nitrate fixation plants at Muscle Shoals during World War I. In World War II, these plants were used for the production of ammonia nitrate for munitions, calcium carbide used in synthetic rubber, phosphorus and phosphate fertilizers.

Tennessee, University of, a non-sectarian coeducational State institution at Knoxville, Tenn., chartered in 1794 as Blount College, and receiving its present name in 1879. The University has a Division of University extension and also experiment stations in agriculture and engineering and a summer school.

Tenniel, Sir John (1820-1914), English artist and cartoonist, born in London. The history of the last half of the 19th century may be gathered from the inimitable blend of serious purpose with kindly satire in his drawings. Some of his best work is to be found in his delightful illustrations of Lewis Carroll's *Alice in Wonderland* and *Through the Looking Glass*, and Moore's *Lalla Rookh*.

Tennis, Court, a game bearing a general resemblance to lawn tennis, played by two or four persons, who hit a ball with rackets to and fro over a net stretched across the center of an enclosed and covered court. Court tennis is popular in England, the best known courts being those at Queen's and Prince's Clubs, at Lord's, and at Hampton Court—the oldest in the country. It is also played in France, but not extensively in the United States—racquets and squash being more popular.

Tennis, Lawn. See **Lawn Tennis**.

Tennyson, Alfred, Lord (1809-92),

English poet, was born in Somersby, Lincolnshire. In 1826 he and his brother Charles produced *Poems by Two Brothers* (1827). They were thought 'too much out of the common for the public taste.' In 1828 he wrote most of *The Lover's Tale*, and in 1829 won the university prize for a poem on *Timbuctoo*.

At Cambridge, Tennyson was one of 'the Apostles,' with his friend Arthur Hallam (son of the historian), Thackeray, and others. In 1830 he published a slim volume of verses, several of which are worthy of his genius. In 1830, with Arthur Hallam, he visited the Pyrenees, which inspired his *Ænone*.

In 1833 appeared Tennyson's next volume of poems, combining high performance and promise with a few puerilities and affectations. Tennyson went on working at his *Morte d'Arthur*; but on Sept. 15, 1833, his friend Hallam died at Vienna. The shock was cruel, but the poet met it with the resolute heart of his *Ulysses*, composed about this time. In 1842 he published the two volumes, which he certainly never excelled. Their extraordinary and original beauty is equalled only by their unexampled variety of tone, topic, and treatment.

Tennyson's success was secured; but as far as pecuniary profit went, it seemed a mere *succès d'estime*. In 1845 the state conferred on him \$1,000 annually. *The Princess*, his next poem, was not very popular. In May, 1850, *In Memoriam* was published anonymously—the record of the three years of sorrow, doubt, and hope that followed the death of Arthur Hallam. *In Memoriam* is not a philosophical treatise, it is not a system of belief: it is a poem. The soul of every mourner may walk with the poet's in the *via dolorosa*, comforted by the charmed beauty and by the sympathy of this greater sufferer. In 1850, also, Tennyson was appointed poet laureate, in succession to Wordsworth. In 1854 he composed *Maud*, which contains songs and lyrics of supreme beauty. *Maud* was the butt of the reviewers; but probably it was, in a pecuniary sense, the most profitable of the poet's books to that date. Tennyson now began to return to the subjects from the Arthurian romances.

The first four *Idylls of the King* appeared in the autumn of 1864, followed by other works including several dramas, which had some success.

The philosophical poems of his old age are valued according to the philosophical ideas of the reader; but there has been no

difference of opinion about the wonderful lyric, *Crossing the Bar*, written in the laureate's eighty-first year—a marvel like the works of the old age of Sophocles and Titian. Tennyson was buried beside his friend Robert Browning, in Westminster Abbey.

The astonishing variety of Tennyson made him a poet as popular as he was learned. Like Virgil, he adorns his verse with many jewels reset from the great poets of Greece. He plucks a flower here and there from the gardens of Virgil, Catullus, and Dante. His mastery of the mystery of words, as in the case again of Virgil, and his perfection of style, stamp his work as immortal.

Tennyson, Hallam Tennyson, Second Baron (1852-1928), British administrator, published his father's biography, *Alfred, Lord Tennyson: A Memoir*, in 1897; edited *Poems by Two Brothers* (1895); the Eversley edition of *Lord Tennyson's Complete Works* (1908), and *Tennyson and His Friends* (1912).

Tenochtitlán, or **Mexatli**, ancient Aztec city on Lake Texcoco, near the City of Mexico. It was destroyed by Cortez in 1521. Sculptures and pottery have been excavated.

Tenor, a name given to the highest natural singing voice of the adult male. It is also applied to instruments which play tenor parts, as the tenor violin.

Tenos, or **Tinos**, one of the Cyclades, Grecian Archipelago, s.e. of Andros, covers an area of 79 sq. m. The capital is Tenos, on the s. coast. Wine and marble are exported; p. 12,000.

Tenrec, or **Tanrec**, a nocturnal, hibernating animal of the genus Centetidae, found in Madagascar, and often called the Madagascar Hedgehog. The tenrec is esteemed for food by the natives. In appearance it resembles the ordinary hedgehog.

Tense, in grammar, the indication of time by varying verb forms, differentiated by inflectional or vowel changes or the use of verbal phrases.

Tent, a shelter made of a flexible material, generally canvas, supported by one or more poles, and stretched by cords that are secured by pegs. Tents formed of goat and other skins were in use in the earliest times. They were also used by the Jewish patriarchs, the Greeks, and the Romans. The Persian monarchs had magnificent tents for travelling or for accommodation in the hot season, some of them capable of containing a hundred beds. In mediæval times princes and wealthy nobles owned large tents, divided into sev-

eral compartments, adorned with silk and damask hangings and golden cords.

Tents are sometimes used with an army in the field; but they very much encumber the movements of troops. There are five types of tent in use in the U. S. Army, the common form accommodating three men. The other types are the wall tent, the conical wall tent, the hospital tent, and the small shelter tent.

Tentacles, in zoology, a term applied to elongated processes or appendages used as organs of touch or for exploration or prehension.

Tent Caterpillar (*Clisiocampa Americana*), a species of caterpillar, two to two and one-half inches in length, common in North America. The egg clusters deposited on the smaller twigs during June and July hatch from July to September; but the young caterpillars do not emerge until spring. They then spin the silken tents which serve as their common home. Growth is by moulting, which occurs five times. The medium-sized, hairy, brownish or buff-colored moth lives for three to seven days, depositing its eggs on the second or third day. The best method of suppression is the destruction of the egg clusters; but spraying with Paris green is also effective.

Tenure means the manner in which lands or tenements are held, or the services which the tenant owes to the lord of whom he holds. When land is the subject of absolute ownership, the tenure is said to be *allodial*; when it is held of a superior, the tenure is *feudal*. All land in England has been brought under the feudal system, and is held of some lord as superior; but before the Norman Conquest some lands were allodial. Under the feudal system the king is lord paramount, so that all land is ultimately held of the crown, though there may be mesne or intermediate lords. In the United States, feudal tenures do not exist, all land being held allodially, subject only to the right of eminent domain in the state. The term is sometimes used in connection with an estate less than a fee simple or complete ownership.

Tenure of Office Act, passed in 1867, limited the power of the President of the United States over the removal of public officials. Prior to this time, in the absence of any constitutional provision, the President had been allowed to exercise the power unhampered; but owing to the bitter conflict between Congress and President Johnson over the question of Reconstruction, the Repub-

lican leaders in Congress deemed it expedient to curtail his power of removal. President Johnson declined to recognize the constitutionality of the act; and when in February, 1868, he dismissed Secretary of War Stanton, after the Senate had refused to concur in his removal, impeachment proceedings were begun against him. In 1869, the act was greatly modified; and in 1887 was entirely repealed.

Teocalli ('house of God'), temple of the ancient Mexicans, was in shape a four-sided truncated pyramid, facing the four cardinal points, and rising in several terraces, on the top of which was the temple proper, with idol and sacrificial stone. Surrounding the teocalli were, in most cases, large courts occupied with the priest's dwellings, and used for the sacrificial rites. The pyramid of Cholula, rising in four terraces, covered over twenty acres, and was 177 ft. high.

Tepee, the conical tent of the Plains Indians. The word is from the Sioux and signifies 'where I live' or home. The true tepee was a framework of poles covered with buffalo skins. It is a type of dwelling well adapted to the roving life of the Plains Indians, as it is easily taken down and carried from place to place.

Tepic, territory, Mexico, on the Pacific coast. There is a low coastal range with mountains in the eastern portion. The chief river of the territory is the Lerma. Silver, copper, and lead are mined. Cereals, cotton, tobacco, sugar cane, coffee, beans, and rice are grown. San Blas is a resort and the chief port. Tepic is the capital and also a resort. Area, 11,275 sq. m.; p. 171,337.

Teramo (ancient *Interamnium*), capital of Teramo province, Italy, on the Tordino; 80 m. s. of Ancona. It has silk spinning and manufactures of pottery, straw hats, and leather. Its cathedral dates from the 14th century; p. 28,130.

Teraphim, household deities, worshipped by Israelites, Aramaeans, and related peoples. The word is connected with the Hebrew word for 'shade, ghost,' and it is supposed that they represented deified ancestors. Since Michal used a muffled teraphim to imitate David, we infer that some of them represented the human figure and were nearly life size. Others must have been smaller, for Rachel concealed them beneath her.

Teratology is the science which deals with pre-natal malformations and monstrosities. Monstrosities and malformations are

the results of disturbances in the normal development of the individual before birth. There are many theories for the causation. Among the older is that of 'maternal impressions,' that is, that the impressions received by the pregnant mother during experiences of great stress are transmitted to the foetus, in 'birthmarks.'

The more recent theories for the development of monsters may be divided into three groups, according as the causal factor involved is mechanical, pathological, or embryological. The third or embryological theory is the one commonly now accepted by scientists. Its distinguishing feature is the assertion that monstrosities are due, not to special causes, but to the causes of disease acting upon the embryonic organism.

Terburg, or **Terborch**, **Gerard** (c. 1617-81), Dutch painter, was born in Zwolle. His style is characterized by accuracy and finish. Two portraits by Terburg are in the Metropolitan Museum, New York.

Terceira, mountainous island of the Azores. Agriculture is the chief occupation, the crops consisting of maize, tea, sugar beets, tobacco, and bananas. The chief town is Angra.

Terebinth, 'the tree that weepeth turpentine' of Drayton, the 'terebinth good for gotes' of the *Shepherd's Calendar*, is an old name for the silver fir (*Pinus picra*). *Pistacia Terebinthus* is also known as 'terebinth tree,' exuding the Cyprian turpentine of the ancients.

Teredo, or **Ship Worm**, a burrowing lamellibranch mollusc, which is exceedingly destructive to submerged timber, and often works great havoc in wooden piers. Supports of piers, etc., are usually protected from ship worms by copper sheathing or by broad-headed nails driven in close together. Ship worms are widely distributed, a common species being *T. navalis*. The larva having attached itself in a crevice of the wood, develops teeth for boring purposes, and within five weeks has grown into a ship worm thousands of times the size of the larva.

Terence (c. 190-159 B.C.), Roman comic poet, his full name being **PUBLIUS TERENTIUS AFER**. He was born in Carthage, and was brought to Rome as a slave at an early age. His master was a senator, Terentius Lucanus, who gave him the education of a free man, and manumitted him. He wrote and exhibited six comedies, adapted chiefly from Menander. Terence has always been regarded as a

model of purity in Latin. Clearly he appealed rather to an aristocratic circle of critics than to the Roman populace.

Teresa, or Theresa, Saint (1515-82), was born in Avila, Old Castile. While still a child she set out with her brother to seek martyrdom. She entered (1534) the order of the Carmelites at Avila but a revolution in her soul, begun by the reading of Augustine's *Confessions*, was completed under the experience of her brother's death. In 1562 she dedicated herself to the mission of reforming the Carmelite order. Single-handed she had to face the opposition of all traditional Spain; but her courage and happy spirit ultimately triumphed. She was canonized (1622), and in 1814 proclaimed the patron saint of Spain. Among her works, written in excellent Spanish, are her *Autobiography*, *Way to Perfection*, and 342 *Letters*.

Terhune, Albert Payson (1872-1942), American author and traveller, was born in Newark, N. J. His mother was 'Marion Harland' and his wife is the composer, Anice Terhune. He is best known for his stories in which dogs, particularly collies, play a prominent part. Besides numerous stories and verses in the magazines, he has written *The Secret of the Blue House* (1904); *The New Physical Culture* (1906); *The World's Greatest Events* (1908); *The Fighter* (1909); *N. Y. World's Educational Series* (1913); *Lad: a Dog* (1919); *Wolf* (1924); *Lad of Sunnybank* (1928); *To the Best of My Memory* (1930); *The Son of God* (1932); and many others.

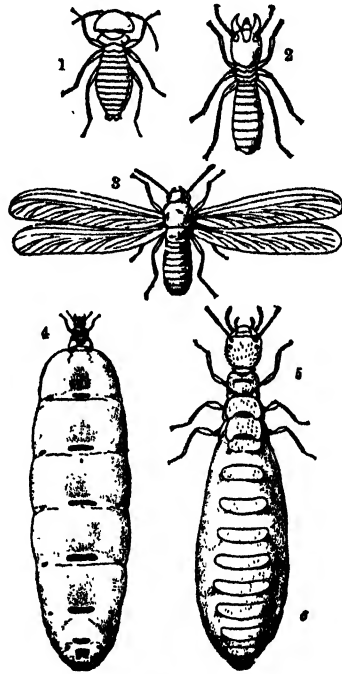
Terhune, Mary Virginia ('Marion Harland') (1830-1922), American author, was born in Amelia co., Virginia, and was educated privately. She was editorially connected with the *Home Maker*, *St. Nicholas*, the *Philadelphia North American*, and other periodicals. Besides fiction, biography, and historical articles, she wrote extensively on topics connected with the home. Her many books include: *Marion Harland's Complete Cook Book* (1903); *Autobiography* (1911); *The Long Lane* (1915).

Termini Imerese (ancient *Thermae Himenses*), seaport on the n. coast of Sicily, near the site of the ancient Himera, whose ruins are still visible; 23 m. by rail s.e. of Palermo. Its hot saline springs are much frequented; p. 20,131.

Terminus, in ancient Roman religion, a god who presided over boundaries, both pub-

lic and private. Terminus was, in fact, Jupiter under a special aspect.

Termites (*Termitidae*), a family of insects, often but erroneously called white ants. Like the true ants, however, the termites are social insects, living in colonies, and building large nests. The species which has always roused most interest is *Termes bellicosus* of Africa. This species forms very large nests,



Termites.

1, Worker; 2, soldier; 3, male; 4, queen, abdomen distended with eggs; 5, supplementary queen (*Termes flavipes*).

sometimes twenty ft. high, built of decayed wood and of the excreta of the termites, and from it subterranean passages extend in all directions. Great damage has been done by termites in city dwellings, pillars having been partially eaten away before their presence was discovered. Once the insects are thoroughly colonized underground, extermination is difficult.

Tern, a name applied to the members of a group of genera of the gull family (*Lariidae*), these genera constituting a sub-family, the *Sterninae*. Terns generally resemble the

gulls, but are much smaller, more slender and graceful in build, and have very long pointed wings, and a usually forked tail. The flight is irregular and hovering; owing to the forked tail and swooping movements the birds are often called sea-swallows. Terns are very widely distributed, and are markedly migratory in habits. A number of species occur along both American coasts, and some visit the Great Lakes.



Tern.

Terni (anc. *Interamna Umbrica*), tn., Italy. Its Roman remains (amphitheatre, bath, etc.) are of the most interesting nature. The Velino waterfall (the marble cascade) is in the neighborhood; p. 26,770.

Terpsichore, the muse of dancing, being one of the nine Muses.

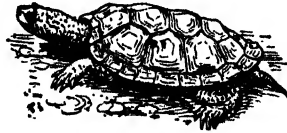
Terra, or **Tellus**, in Roman mythology, the goddess who personified the earth.

Terracina, tn., Italy, has the famous Roman remains, the Temple of Venus. The ancient city occupied the hill above the modern town; p. 10,995.

Terra Cotta. The term commonly includes those clay products used for structural decorative work, and which, owing to their size or form, cannot be moulded by machinery, but have to be shaped by hand. The name terra-cotta has, however, also been applied to many burned clay busts, statuettes, and even vases made by the ancients, notably the Greeks, which, however, are 'to be classed as earthenware pottery.' The manufacture of terra cotta stands on a much higher plane in ceramic technology than it did formerly, and the number of colors now produced is very great. Terra cotta makers have recently directed their attention toward the production of effects imitative of the different kinds of building-stones, as well as toward increasing the complexity of their designs. Much of the Della Robbia work, made in the 15th century, is of this type. Terra cotta is manufactured in enormous quantities in the United States, New Jersey, Pennsylvania, and New York being important producers.

Terra del Fuego. See **Tierra del Fuego**.

Terrapin, a name given in America to a considerable number of the smaller tortoises, but especially to *Malaclemmys terrapin*, the species which is most highly valued as food. This terrapin is, in some localities, kept in captivity in what are called 'crawls.' Here



Terrapin.

the terrapins are reared, and then fattened for the market on shrimps and crabs. The females, called 'heifers,' are more highly prized than the males or bulls, and are larger, reaching a length of about eight inches on the plastron.

Terre Haute, city, Indiana, 70 m. s.w. of Indianapolis. The leading manufactures are foundry products, structural iron, glass, brick, tile and paving blocks, artificial building stone, confectionery, and canned goods. Terre Haute makes large shipments of grain, pork, coal, and oil. The name *Terre Haute*, French for 'high land,' refers to the elevation of the site, which is 60 ft. above the river; p. 64,214.

Territorial Waters are waters considered as belonging to a particular state, and falling under its jurisdiction. They are quite distinct from the high seas, which are free to all nations, and extend usually to a marine league from the shore. The sovereignty of a nation over the seas round its shores within this limit is more for protective than for prohibitive purposes, and does not signify ownership. The innocent passage of vessels of other nations within this line is not restricted, but all right to fishing is excluded, and no vessels can enter legally therein for the purpose of defrauding the custom laws or for naval maneuvering. Inclosed waters belong to the state within which they are, boundary waters such as rivers are delimited by treaty and custom, and channels forming passages between different portions of the high seas are free to the innocent passage of all ships. Notable exceptions are the Dardanelles, Suez, and Bosphorus, the right to pass through which is regulated by treaty. The advent of prohibition in the United States brought the question of extent of territorial waters into

prominence, particularly in the case of a British vessel, the *I'm Alone*, carrying rum in the Gulf of Mexico and sunk by the U. S. Coast Guard, a case not settled until January, 1935, when the United States was held liable only for the property of and injury to the officers and members of the crew involved, not for the value of the cargo, etc.

Terry, Ellen Alicia (1848-1928), English actress, was born in Coventry. When eight years old she made her first appearance at the Princess's Theatre, London, as the boy Mamillius in *The Winter's Tale*. In Decem-

The letters between her and George Bernard Shaw were published in 1931.

Tertiary, or **Cenozoic**, a geological epoch of the earth's history, subdivided into the Eocene, Oligocene, Miocene, and Pliocene systems. Its lowest strata rest unconformably on the Cretaceous, while the whole series is in turn overlaid by the Quaternary, Pleistocene, or Glacial deposits.

The fauna of even the earliest Tertiary rocks have quite a modern facies when compared with that which preceded it, and this becomes accentuated in the higher beds. The



Terra Cotta Decoration: 'The Annunciation,' by Andrea della Robbia.

ber, 1867, she acted for the first time with Henry Irving, playing Katharine to his Petruchio in Garrick's version of *The Taming of the Shrew*. It was not, however, until 1875, when she appeared as Portia in a revival of *The Merchant of Venice*, that real success was won. Miss Terry's appearance with Henry Irving in December, 1878, when she played Ophelia to Irving's Hamlet, was the first of a series of delightful Shakspearian and other impersonations, the most noteworthy of which were Portia, Juliet, Beatrice, Viola, Lady Macbeth, Queen Katharine, Cordelia, Imogen, Marguerite in *Faust*, Nance Oldfield, Ellalina in *The Amber Heart* (described as one of her most exquisite creations), Rosamond in Tennyson's *Becket*, Madame Sans Gêne, Alice-sit-by-the-fire. She visited the United States many times.

existing continents and oceans have for the most part originated, and have had their outlines fixed, in this epoch. Extensive deposits belonging to this time occur on the Gulf border, the Pacific coast, and in the interior representatives are fresh-water lake and fluvial deposits, and have a wonderfully rich and interesting fossil fauna, among them being the ancestors of the horse.

Teruel, city, cap. of prov. of Teruel, Spain, 88 m. s. of Saragossa. It is a very ancient city, on a high bluff over the Guadalquivir, commanding a fertile plain shut in by mountains. It has narrow, ancient streets, with many old churches; p. 13,720.

Teachen, tn., Poland, with manufactures of furniture, linen, vehicles, beer, and spirits. It has the remains of an old castle; p. 24,000.

Tesla, Nikola (1857-1943), Am. inventor

born in Austria-Hungary. He joined Puskas in introducing telephones in Hungary, and invented several improvements in telephone construction. In 1884 he came to the United States and became an employee in Edison's experimental works. While thus engaged he invented improvements in dynamos and other electrical machines and formed a company to exploit them. His polyphase current motors, unipolar dynamos, incandescent lamps, the Tesla coil transformer, and other inventions have been successful.



Ellen Terry.

Testimony. Oral statements under oath made by a witness in a judicial proceeding. Evidence is a broader term, including testimony as well as all other means of legal proof.

Test-papers are slips of paper impregnated with some reagent, and used chiefly in chemistry for testing the presence of alkalis and acids. The most common kind are those containing red or blue litmus, which are turned blue and red by alkalis and acids respectively.

Tetanus, or **Lockjaw**, is an acute specific infective disease characterized by involuntary tonic muscular spasms, which tend to pass into paroxysmal convulsions. It is caused by the tetanus bacillus, commonly present in garden soil, stable manure, and street sweepings, and generally gaining access to the human body through a wound. The organism also attacks horses, sheep, goats, and oxen, and more rarely rats, rabbits, dogs, and cats. In man the usual period of incubation is from four to seven days, but it may be prolonged even to four weeks. The tonic spasms appear first in the muscles of the jaws, and later involve those of the face and neck. The lockjaw and tetanic facies are thus among the earliest symptoms. Eventually the muscles of the trunk and limbs are affected. Every wound likely to lodge tetanus spores should be thoroughly cleaned, and all foreign bodies, such as splinters, should be speedily removed. There is an antitoxin which does not free the nerve cells from the poison already absorbed, but it destroys the toxin still circulating in the body fluids. Consult U. S. Public Health Reports; U. S. Bureau of Animal Industry's *Bulletins*; Haynie's *Tetanus, diagnosis, prevention and treatment* (1932).

Tetrahedrite, an important mineral sulphide of copper and antimony, frequently carrying, in addition, arsenic, and occasionally bismuth. The copper is often replaced by iron, zinc, mercury, lead or silver. It is usually known among miners as *gray copper*. It is flint gray to iron black, without cleavage by which it is distinguished from its more common associates, chalcopyrite, pyrite, sphalerite, and so forth.

Tetrarch, the ruler of the fourth part of a country. There were tetrarchs of Thessaly and of Macedonia, under Roman rule; and each of the three Gallic tribes in Gallia was divided into four parts ruled by a tetrarch. The title is best known in connection with the family of Herod.

Tetrazzini, Luisa (1874-1940), Italian prima donna, was born in Florence. In London as Lucia di Lammermoor (1907) she scored a great success; and has since added to her reputation by her brilliant rendering of many soprano rôles, especially in the *Barber of Seville* and *La Traviata*. In the United States she sang with Hammerstein's Manhattan Opera House Company, and in 1913-4, with the Chicago Opera Company, and has since toured Europe and America in concerts. In 1921 she published *My Life in Song*.

Tetuan, fortified seaport, in the Spanish zone of Morocco. The town contains Moorish mosques and a lofty citadel. The environs are fertile. Exports include oxbides, beeswax, eggs, Moorish slippers, almonds, linseed, oranges and woolen goods. Here is the residence of the Spanish High Commissioner who controls the administration of the Government; p. about 25,000, including Moors, Europeans and Jews.

Teutones, a Germanic tribe which, in conjunction with the Cimbri, after defeating several Roman armies and devastating Gaul, was annihilated at Aquæ Sextiæ by Marius in 102 B.C. In later times a tribe of Teutons dwelt in Northwest Germany, between the Elbe and the Baltic. They were probably the original stock from whom the invading Teutones were an offshoot.

Teutonic Knights (Deutscher Ritterorden), a quasi-religious society of German crusaders; owed its beginning to merchants of Bremen and Lübeck, who, under the leadership of Duke Frederick of Swabia, opened a hospital at Acre in 1190; but it speedily became a military rather than a religious caste. In the 13th and 14th centuries Prussia, under the Teutonic Knights, became a great commercial and maritime power, with its capital at Marienburg. The organization was abolished by Napoleon in 1809, but was reinstated as an Imperial Austrian order in 1834, and reorganized in 1840. Besides the knights, it has priests and sisters who educate children and care for the sick.

Tewfik Pasha, Mohammed (1852-92), khedive of Egypt, was the eldest son of Ismail Pasha, whom he succeeded in 1879. The principal events of his rule were the insurrection of Arabi Pasha, suppressed at Tel-el-Kebir; the uprising of the Mahdi in the Sudan; and the Sudan campaigns. Tewfik was, on the whole, a loyal ally of the British.

Tewkesbury (Roman *Etocessa*), market town, Gloucestershire, England. The abbey church, a magnificent structure, founded at the beginning of the 12th century, contains ancient monuments. Of the abbey, originally founded about 715, part of the cloister, and some other fragments remain; p. 6,455.

Texarkana, the name of two adjoining cities, one in Texas and one in Arkansas. The post office is situated on the State line, being half in each State. The two cities have separate mayors, city governments, and school systems; p. of the two, 40,628.

Texas (popularly, the 'Lone Star State'),

one of the South Central States of the United States, is bounded on the n. by New Mexico and Oklahoma; on the e. by Arkansas, Louisiana, and the Gulf of Mexico; on the s. by the Gulf and Mexico; and on the w. by Mexico and New Mexico. The Red River on the n., the Sabine River on the e., and the Rio Grande on the s.w. mark a large portion of its boundary. With extreme dimensions of 780 (e. to w.) and 750 m., it has a total area of 265,896 sq. m., of which 3,498 sq. m. are water. It greatly exceeds any other State in area. Texas is divided into a number of geographical regions which may be designated as the coast belt, the prairie belt, the region of the Great Plains, the Staked Plain, and the mountainous region. The State has a great number of rivers, all of which flow in a southeasterly direction. The most important of these, beginning with the Red on the northern boundary and the Sabine on the eastern boundary, are the Neches, the Trinity, the Brazos, the Colorado, the Guadalupe, the San Antonio, the Nueces, and the Rio Grande. The only lake of any size is Ferry Lake, extending into the State from Louisiana.

The great expanse of Texas, covering as it does more than 10° of latitude, and ranging in altitude from the sandy coast plain to the rugged ranges of the west, results in a great diversity of climatic conditions. Along the coast the temperature is high but equable. The mean temperature at Galveston is 84° F. for July and 44.5° for January, with extremes of zero and 104°. Toward the n.w. the temperature becomes more continental, the extremes are greater, and decisive changes are more frequent. At El Paso, in the extreme w. the mean is 82° for July and 44° for January, with extremes of -5° and 113°. In the n.w. the January and July means are lower than at El Paso, while the extremes are even more marked. The mean annual precipitation varies from about 50 in., between the lower courses of the Sabine and Trinity Rivers, to 9 in. at El Paso, being even less in some of the region along the Rio Grande. In much of the region s.w., w. and n.w. of the center of the State, recourse to irrigation is necessary. Most of the State is capable of cultivation. The narrow coast belt is mainly sandy, while the soil of the prairie belt is composed of sand and clay mingled with vegetable mould. Farther w. the soil is a composition of weathered limestone and clay, which needs only water to develop its fertility. Texas is one of the leading States

in the value of its mineral products. The petroleum and natural gas fields in Texas are the most extensive in the Union, and it is one of the chief sources of helium. Other important minerals are coal, sulphur, graphite, asphalt, marl, gypsum, mercury, and fuller's earth.

There is little wooded area in the western part of Texas and the forests in the e. have been greatly reduced by lumbering. The principal area of merchantable timber lies along the Louisiana line, extending westward to the Trinity River. This is chiefly short-leaved and long-leaved yellow pine. Small areas of merchantable hardwoods occur along the rivers. The State has excellent fisheries, notable especially for shrimp. Spotted sea trout, oysters and red snapper are also obtained. Texas is preeminently an agricultural State. Of the entire land area, about three-fourths is in farms. Texas surpasses any other State in the production of cotton, which is grown mainly in a belt extending from the Red River to the Colorado. Rice culture is important, and grains, fruits, and vegetables are exported in quantities. Texas is famous for its stock-raising interests, and leads the Nation in the cattle industry. The manufactures of Texas have been greatly stimulated by the rapid increase in the volume of raw materials within the State. The leading industries are petroleum refining, oil, cottonseed and cake, meat packing, flour and other grain-mill products, foundry and machine shop products. The leading manufacturing centers are Dallas, Houston, Fort Worth, San Antonio.

The port of Galveston is one of the principal Southern ports in the value of commerce and is an important port of the United States. The principal exports are cotton, grain, petroleum products, flour and meat. The State of Texas exceeded New York in the value of exports of goods produced within the State. The population of Texas is 7,711,194. Negroes number 977,458; Indians, 2,736; Chinese, 2,435; Japanese, 957; Mexicans, 683,681. The urban population in towns and cities of at least 2,500 inhabitants, constitutes 59.8 per cent of the total. The largest cities; Houston, 596,163; Dallas, 434,462; Fort Worth, 278,778; Austin, 132,459; El Paso, 130,485; Beaumont, 94,014; Waco, 84,706; Galveston, 66,568; Port Arthur, 57,530. Control of education lies in a State board, composed of the Governor, Comptroller, and Secretary of State; of a State super-

intendent of public instruction; of county superintendents; of superintendents and boards of trustees in corporate towns and cities; and of county and local boards of trustees in the rural districts. Separate schools must be maintained for white and for colored children, and equal facilities provided for each. Schools must be open at least six months annually. There are many institutions of higher learning both state-controlled and private.

Early explorations and settlements in the present State of Texas were for the most part made by Spanish adventurers from the neighboring settlements of Mexico. The best known of the Spanish-Mexican explorers are Coronado (about 1540) and Espejo (1582). Spanish settlements confined entirely to Jesuit missions, were begun about 1582. In 1800 an exploring party was led into the region by Philip Nolan, who was the first American to cross from Louisiana. Following the Louisiana Purchase in 1803, explorers and colonists flocked to the territory to make a virtual conquest through settlement. In 1821 Mexico secured its independence of Spain, and in 1824 established a federal republic. Under the republic, Texas, with Coahuila and Nuevo Leon, was made a separate state.

In 1832 Texas called a convention to elect a president, and asked separate government and other prerogatives. In 1835 Santa Anna, then president of Mexico, attempted to reduce the State to a department and to collect duties. Open warfare followed. In February, 1836, Santa Anna besieged the fort of the Alamo, San Antonio, which was bravely defended against overwhelming odds, but in which the entire garrison perished. Soon afterward, on April 21, Santa Anna was defeated on the banks of the San Jacinto by Gen. Sam Houston, and taken prisoner, an event which terminated the war in favor of Texas. In September of the same year a constitution was adopted. General Houston was chosen governor, and Austin was made the State capital. Independence was soon followed by desire for annexation to the United States. On Dec. 29, 1845, it was admitted to the Union. The question of the western boundary brought on the Mexican War. The Treaty of Guadalupe Hidalgo (Feb. 2, 1848), vastly increased the area of the United States and fixed the Texas boundary at the Rio Grande. The United States afterward paid Texas \$10,000,000 to surrender its claim to an extensive region in New Mexico. A new constitution

was adopted in 1869, and a third in 1876. On Sept. 8, 1900, Galveston was visited by a terrific hurricane, accompanied by an inundation which swept the coast for 30 m., destroying 6,000 lives and \$18,000,000 in property. The city recovered, however, with remarkable rapidity. In 1906 Brownsville became a center of national interest through the dismissal by President Roosevelt of the colored battalion stationed at Fort Brown.

In 1917 Governor Ferguson was impeached for alleged misappropriation of public funds and resigned. In 1924 Mrs. Ferguson became governor on an anti-Ku Klux platform and as a means of vindicating her husband.

One of the largest irrigation projects in the U. S. was completed in Willacy Co. during 1939, bringing water to 70,000 acres in the Rio Grande valley. The project cost \$5,000,000 and it soon enabled the land to produce 3 or 4 crops of vegetables and fruits per year. Federal funds were used on the project. See Writers' Project, *Texas* (1940).

Texas, Agricultural and Mechanical College of, an institution of higher learning for men, established under the Morrill Act of 1862, located at College Station, Brazos co., Texas. Its first session opened in 1876.

Texas Christian University, a co-educational institution at Fort Worth, Texas, was founded in 1873 as 'Add-Ran College.' Later known by other names, the present name was given in 1910, when the school opened in Fort Worth.

Texas Fever Tick (*Boophilus annulatus*), a parasitic insect formerly a serious menace to cattle throughout the Southern States now rapidly being eradicated. Combative measures are the periodic use of arsenical dips and a system of pasture rotation whereby the ticks are starved.

Texas, University of, a State educational institution for both sexes at Austin, Texas, organized in 1883, and comprising a college of Arts and Sciences, Graduate School, Summer School, and Colleges of Education, Engineering, Law, Business Administration and Medicine, a Division of Extension, and a Division of Conservation and Development of the Natural Resources of Texas. The College of Medicine is at Galveston and the School of Mines and Metallurgy at El Paso.

Texas vs. White, an important case decided by the United States Supreme Court in 1868. The case was one in which the State of Texas, claiming certain United States bonds as its property, asked that an injunc-

tion be issued by the Court to restrain the defendants, George W. White, and other persons, who had obtained the bonds from the State authorities by virtue of an act passed during the period of rebellion, from receiving payment from the National Government, and to compel the surrender of the bonds to the State. The contention of the plaintiff was that all the acts of the persons controlling the State during the period of rebellion were void, and that the transfer of bonds was illegal. The Court decided in favor of the plaintiff. In the majority opinion, prepared by Chief Justice Chase, it was held that 'the Constitution, in all of its provisions, looks to an indestructible union, composed of indestructible States'; that the Ordinance of Secession and all acts of the legislature intended to give effect to it 'were absolutely null'; that the task of the National Government, upon the suppression of the rebellion, was to restore the broken relations; and that the ultimate power in reconstruction resided in Congress.

Textiles. Used to denote the manipulation from the raw condition, through to the finished state, of any of the kingdoms of fibers employed by man for this purpose. It includes practically all of the materials used in the making of clothing, inner and outer, for the human race all over the world. Textiles also include carpets, rugs, wall coverings, decorative fabrics and a large range of industrial fabrics. The term implies all materials from the lowest quality types—muslin, cheesecloth, tobacco cloth—to the very high quality, expensive fabrics such as damask, brocade, brocatelle, tapestry and particular Jacquard fabrics. The types, kinds and varieties of cloth make an almost endless chain from the lowest to the highest in quality, texture, finish, weight, price, width, sheerness, compactness.

There are two types of natural fibers. Animal fibers include alpaca, camel hair, cashmere, cow hair, extract wool, horse hair, llama, mohair, mungo, remanufactured wool, reused wool, reprocessed wool, shoddy, silk, spun silk, vicuna, wool and worsted. Vegetable fibers include abaca, cotton, flax, hemp, henequen, isle, jute, kapok, pineapple, ramie, sisal, straw.

Man-made or manufactured fibers and filaments include: Regenerated—viscose, cuprammonium, nitrocellulose; Cellulose Derivative—cellulose acetate type known as acetate rayon; Animal type represented by Lanital made from skim milk; Vegetable type—Zein from cornmeal, azlon, and the soybean fiber.

True synthetic fibers and filaments include the resin filaments Vinyon, Vinyon H, Vinyon N and the wonder fiber made from "coal-air-water," nylon.

New synthetic fibers and filaments include the acrylic resin filament, Orlon; Vinylidene chloride represented by Saran and Velon; Glass fibers such as Fiberglas and glass fibers; and Hydrocarbon type with rubber and butadiene as examples.

Mineral fibers include asbestos, metallic thread, slag wool and tinsel.

Modified fibers include immunized cotton, modified rayon fibers, mercerized cotton, non-shrinkable wool, rayon staple.

The four ways in which textiles differ are:

1. Raw Material: Wool, cotton, rayon, asbestos, nylon, fibreglas, acetate rayon.
2. Construction: Woven, knitted, felt; plaited, braided or lace.
3. Color: Red, blue, gray, brown, natural, neutral, pastel shades, etc.
4. Finish: Boardy, cashmere, ciré, clear, crepe, crisp, cropped, delustered, dull, duplex, even, face-finish, glazed, glossy, harsh, lustrous, mercerized, moiré or watermarked, moss, napped, natural, pebble, plain, reversible, rough, satin-like, satiny, semi-finish, sheared, smooth, soft, starched, stiff, surface-finish, undressed finish, unfinished-finish and uneven finish.

It can be safely stated that the development and meteoric rise of the textile industry has been one of the truly great single factors for the good of mankind in his efforts to share in the eight necessities of life—food, shelter, clothing, transportation, fuel, tools, accessories and adornments. The first great benefits of the Industrial Revolution centered around things textile; the era of the American Revolution and the French Revolution, the changes in standards of living, the Commercial Revolution and the rise of factory and plant methods of manufacture have given much impetus to this leading industry.

The distaff and spindle have been replaced by such complex but smooth-running machines as the card, the comb, the roving frame, the spinning frames whether they be of the mule, ring, flyer or cap type; the dressing creel, the high speed, fully automatic loom, and the highly productive, intricate knitting machine.

Modern textile machinery has been developed from the following early inventions now studied by all high-school students: In 1738, John Wyatt (Wyeth) introduced drawing rollers which made possible the spinning

of yarn without the use of the fingers. In this year, John Kay invented the fly shuttle while his son, Robert, invented the drop-box loom in 1760. Louis Paul and Wyatt invented the revolving cylinder carding machine in 1748. James Hargreaves, in 1754, brought out his spinning jenny, named in honor of his wife. This was the first machine which was capable of spinning more than one yarn at a time. 1768 saw Sir Richard Arkwright, often spoken of as the Father of the Cotton Industry, revolutionize the art of spinning when his frame, which drafted, twisted and wound the yarn onto a tube or cop, made its debut, the first type of upright spinning frame. In 1772, John Lee developed the first feeder for the carding machine. Samuel Crompton, 1779, invented the mule spinning frame by combining the ideas of Hargreaves and Arkwright into a single machine. Drawing, drafting, twisting and winding were now made possible by roller drawing and carriage drawing in this one machine—a hybrid machine still known as the mule and named for this hybrid animal.

In 1789, Edmund Cartwright applied steam by the use of the Watts and Boulton Steam Engine, to the frames which had been developed by Arkwright. He invented the power loom and the combing frame. James Watt(s) brought out the steam engine in 1769 and first introduced his new power in Robinson's Cotton Mill, Nottinghamshire, England, in 1785. Eli Whitney, 1792-94, invented his cotton gin on the Greene Plantation, near Savannah, Georgia. This was the machine which was to make King Cotton; one of the greatest inventions of all time since it made possible the fulfillment of the demand for cotton to keep pace with the demand for machine-made yarns and fabrics. Horrocks, in 1813, brought out his dressing frame for making loom warps. Joseph M. C. Jacquard exhibited his loom at the Paris Exposition in 1810, but it was not until 1820 that the famous Jacquard loom became practical and truly functional. At this time, Stephen Wilson, prominent English silk manufacturer, received a patent for a reading machine and for a punching machine to punch out the cards used in Jacquard weaving, the "piano-machine" still in use today.

Cotton, the universal fiber, and said to have over 10,000 uses, leads in textile production and usage. Three times as much cotton is used after all other textile fibers, major and minor have been combined for world supply in yarn or fabric. This country



American Viscose Corporation

Viscose rayon cake made of thousands of yards of continuous filament yarn. The knitted cover, pulled over the cake for shipment, protects the yarn.

now produces about 40 per cent of the world supply. Texas raises 25 per cent of the cotton grown here; it also supplies one-fourth of the wool grown in the United States.

The four major textile fibers are cotton, man-made and synthetic, wool and silk, in that order. The following summary will show their importance (U. S. Fiber Figures):

<i>Fiber</i>	<i>Millions of Pounds</i>	<i>Per Cent of Total</i>
Cotton:	4,675	69.5
Man-made,		
synthetic:	1,435	21.3
Man-made—		
rayon	1,310	19.4
Synthetic—other	125	1.9
Wool-worsted:	615	9.1
Apparel	420	6.2
Carpet	195	2.9
Silk	10	.1
Totals	6,735	100.0

The total per capita consumption of these fibers reveals that the United States leads the world in this respect with about 42 pounds; Sweden is second with about 26 pounds while Canada is third with about 25 pounds. Only four other nations—Belgium, Switzerland, United Kingdom and Australia—in that order, use as much as 20 pounds per year.

The United States and North America use about 40 pounds in annual fiber consumption compared with about 13 pounds in Europe,

(exclusive of U.S.S.R.), 8 pounds in Latin America, 3.5 pounds in Asia and about 2.5 pounds in Africa.

Among the great cotton-manufacturing nations are the United States, Great Britain, India, Belgium and Italy. The Carolinas, Georgia, Alabama, and Massachusetts lead in the manufacture of cottons in the U. S. The exodus of cotton mills from New England to the South, since 1935, has had a tremendous effect in the social, political and economic changes observed in the changing life of this country.

Woolens and worsteds are made chiefly in the United States, Great Britain, France, Germany, Italy, Belgium, Ireland and Austria. While most of the woolen goods made here center in New England, there are at present several woolen mills in the South, many of these owned by northern plants which have become aware of inviting conditions offered by the southern area.

Man-made and synthetic fibers are made in all major nations of the world. In the U. S. the leading states include Pennsylvania, Maryland, Delaware, Virginia, West Virginia, North and South Carolina, Georgia, Tennessee and Texas.

The manufacture of linens has always been an important industry in Ireland, Scotland, Belgium and France.

Lace is made in all major nations of the world, chiefly in Belgium, Switzerland, Italy, France, Sweden, Spain, Austria, etc. Much machine-made lace is made in the U. S. with

Rhode Island and Pennsylvania the leading lace centers.

Textiles are machine-made or hand-made, both types having their unique places in the world of today. The Industrial Revolution was the foundation for the present-day gigantic textile industry with its mass production, uniform sizes, job specialization, and progressive assembly lines—each of which make their mighty contribution to the world of textiles with its fibers, fabrics, finishes and fashions.

Consult *American Fabrics*, 350 Fifth Ave., New York City. *Applied Textiles*, Linton & Pizzuto, Lifetime Editions, 370 Fifth Ave., New York City. *Callaway Textile Dictionary*, Callaway Mills, La Grange, Georgia. See also silk, cotton, rayon, wool, fibers.

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Tezcatlipoca, one of the chief gods of the Aztecs. The creator of the world, he was represented as a handsome man, endowed with perpetual youth. His image, of polished black stone, was garnished with gold plates, and with a burnished shield, in which Tezcatlipoca saw reflected the ongoings of the world.

Texcoco, or **Texcoco**, town, Mexico, on the eastern shore of Texcoco lake, near Mexico City. It was an important Aztec center, being the capital of the Chichemecas' empire, and the point from which Cortes prepared his attack on Mexico; p. 5437.

Thackeray, Anne Isabella (Lady Ritchie) (1837-1919), English author, daughter of W. M. Thackeray, and a member of the Royal Society of Literature. Her publications include the *Story of Elizabeth* (1863); *Old Kensington* (1873); *Toilers and Spinners* (1873); *Anne Evans* (1880); *Mme. de Sévigné* (1881); *Lord Tennyson and His Friends* (1893); *Chapters from Some Memoirs* (1894); *The Truthful Liar* (1903).

Thackeray, William Makepeace (1811-63), English novelist, was born in Calcutta. His knowledge of the humors of Indian civilians and soldiers inspired the immortal pictures of Joe Sedley, Major Geoghegan (the Marbot of Ireland), Colonel Newcome, and many other figures in his novels. In London, he engaged in newspaper work. This is the period of 'Michael Angelo Titmarsh,' of the earlier 'James de la Pluche,' of *The Shabby*

Genteel Story, of *The Hoggarty Diamond*—touched by the great and lifelong sorrow of the author's life when his young wife's ill health, terminating in insanity (1841-4), left him a lonely man, with a broken heart. *Catherine*, too, was of this period. *The Paris Sketch Book* is historically interesting, as is *The Irish Sketch Book* (1843). In 1847 *Van-ity Fair*, started long before, began to appear in its yellow livery and seized the popular imagination. It became immediately a 'best seller' and quickly raised Thackeray to the highest rank in fiction. Thackeray, like Dickens, Scott, and Fielding, is not really greater in his great characters—Becky, Beatrix Esmond, and the rest—than in the multitude of minor persons that crowd his pages and our happy memories.

Thackeray came to the United States in November, 1852, where he delivered his lectures on *The English Humorists*, first in New York, and afterwards in Boston, and other large cities, remaining until April, 1853; and again in 1855 and lectured on *The Four Georges*. Throughout his career he wrote occasional verse which ranges from the burlesque to the exquisitely humorous and pathetic.

Thailand. See SIAM.

Thais, Athenian courtesan, who accompanied Alexander the Great on his expedition into Asia. She is said to have incited Alexander to burn the palace of the Persian kings at Persepolis, in order to avenge the destruction of Athens by Xerxes. After Alexander's death she was attached to Ptolemy, son of Lagus, to whom she bore three children.

Thalamus, name given to the receptacle or terminal part of the axis of a flower. Sometimes the thalamus extends beyond the carpels as a fleshy mass, as in the case of the strawberry; or as a cone round which the fleshy carpels cluster, as in the case of the raspberry; or as a beak, as in geraniums.

Thalberg, Irving Grant (1899-1936), American motion picture producer. He became secretary in a motion picture company, and at the age of 25 was made the head of production of one of the largest studios in America, Metro-Goldwyn-Mayer. He produced one daring success after another, including *Mutiny on the Bounty* which won the award of the Academy of Motion Picture Arts and Sciences for 1935; *Romeo and Juliet* (1936).

Thales, the chief of the seven wise men of ancient Greece, was a native of Miletus, and flourished from about 600 to 540 B.C. In 46-

tronomy his great achievement was his prediction of the solar eclipse which occurred on May 28, 585 B.C. In philosophy he sought for a single element out of which the whole world was formed; this he found in water, or rather moisture. In politics, he is famous for his advice to the Asiatic Greeks to join themselves into a single nation in order to resist the Persians.

Thalia, the muse of comedy, one of the nine Muses.

Thalictrum, a genus of hardy herbaceous plants belonging to the order Ranunculaceae. The earliest species in the Northeastern states is the purplish meadow rue.



Thalictrum (*T. flavum*).

1, Perianth; 2, carpels; 3, single carpel; 4, stamens.

Thallium, Tl, 204.1, is a rare metallic element that occurs in traces in pyrites, and is best prepared from the flue dust of the works in which sulphuric acid is made. The element is a heavy (sp. gr. 11.9), very soft leadlike metal, which melts at 302° C., and is a poor conductor of electricity. The metal is used in fireworks to give a green light. Thallium salts are poisonous.

Thames, River. (1.) A river of England, rising in Gloucestershire, 3 m. s.w. of Cirencester, or perhaps better at Seven Springs in the Cotswold Hills, 3 m. s. of Cheltenham. At London Bridge the river has a width of 266 yards, and below Gravesend it expands into an estuary five m. wide at the Nore.

During the summer the Thames is a favorite holiday resort, house-boats being frequently the temporary homes of pleasure-seekers; and regattas are held at Henley, Kingston, and other places. (2.) A broad tidal estuary in e. Connecticut, extending n. 15 m. from Long Island Sound. New London is on the w. shore, 3 m. from the Sound. There is a naval station here. The rowing races between Harvard and Yale are held on the Thames at New London.

Thane, an old English order of nobility. The name came to be applied to the larger landowners, and the title became hereditary. After the Norman conquest the thanes were for the most part merged in the order of knights. In Scotland the thane was a heritor under the crown, and the name is found as late as the 15th century.

Thanet, Octave. See French, Alice.

Thanksgiving Day, a holiday in the United States appointed by the President and usually the governors of the various states, to be kept as a thanksgiving for the mercies of the year. The festival was first observed by the Mass. Pilgrims after their first harvest, 1621. The date of observance varied until 1864 when Pres. Lincoln set aside the last Thurs. in Nov. That date was followed until 1939 when Pres. Roosevelt set the third Thursday of the month. There was much criticism and about ½ the governors of the states failed to follow the President's lead. Thus in 1939 and 1940 about half the states observed the day on the third and about half on the last Thursday. In 1942 Pres. Roosevelt decreed a return to the traditional date.

Thaxter, Celia (1836-94), American poet, was born in Portsmouth, N. H., and was the daughter of Thomas B. Loughton.

Thayer, Abbott Henderson (1849-1921), American figure painter, born in Boston, was a pupil of Gérôme. For several years after his return to the U. S. in 1876 he painted portraits and landscapes, but finally devoted himself wholly to figure work, in which dignity, grace, and idealism are conspicuous. The New York Metropolitan Museum has one of his figures of young women.

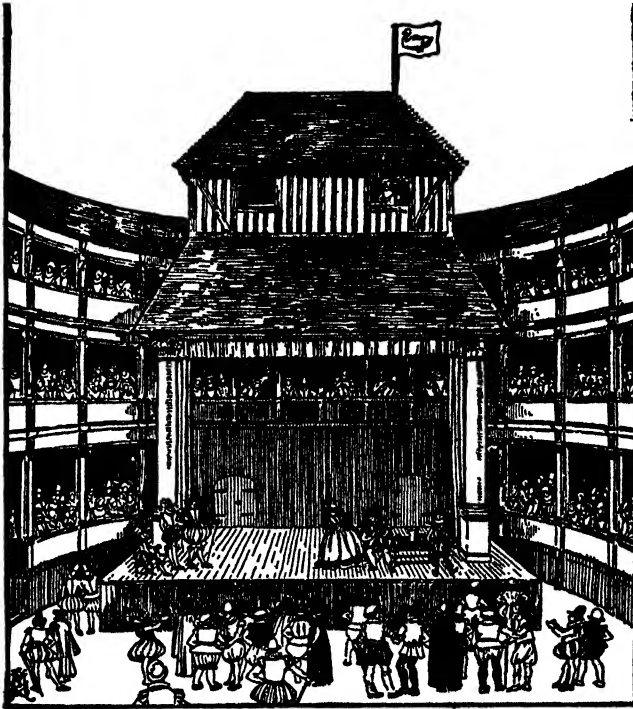
Thayer, William Roscoe ('Paul Hermes') (1859-1923), American author, was born in Boston, Mass. He was graduated from Harvard in 1881, and after several years of newspaper work in Philadelphia, was appointed instructor in English at his alma mater (1888). He made a special study of Italian history. His works include *Life and Times of Cavour* (1911); *Life and Letters of John Hay* (1915); *Germany vs. Civilization*

(1916); *Theodore Roosevelt — An Intimate Biography* (1919); *George Washington* (1922).

Theagenes, the name of several ancient Greek heroes. Theagenes of Thasos was a famous athlete, renowned for his strength and swiftness, and said to have won at least 1300 crowns. He gained a victory in the 75th Olympiad in 480 B.C.

Theatre, a building used for dramatic or spectacular productions. Drama had its in-

platform, standing ten or twelve ft. above the orchestra. The auditorium was exceedingly spacious. The shape was semicircular, with tiers of seats rising one above another—there were over a hundred rows in the center of the theatre at Athens—divided vertically by passages for access. Usually theatres were constructed on the slope of a hill, so that the natural substructure for the seats was provided, and the theatre was open to the sky. The Roman theatre was similar in plan to the Greek.



An Elizabethan Theatre—The Swan—Showing the Galleries Surrounding the Stage

ception in the choric dances performed in Attica during the fifth and sixth centuries B.C. The Greek theatre consisted of three parts—the orchestra, the stage buildings, and the auditorium. Of these, the orchestra, or 'dancing-ground,' is the oldest, dating from the time when choric songs were sung without any dramatic action. It was circular in shape. Behind the orchestra rose the stage buildings, the Greek name for which was *scene*, literally 'a booth.' There were usually three doors opening on to the stage, which was a wooden

In the middle ages no theatres were built; dramatic performances were either under the direction of the church and performed in the church, or were carried on by strolling players in temporary booths. In the sixteenth century, during the reign of Elizabeth, the secular drama rose to great importance and the companies of players occupied increasingly distinguished places in society. The most famous of these companies was that formed by the Earl of Leicester under the leadership of James Burbage, of which Shakespeare eventu-

ally became a member and for which he wrote and produced his plays. Burbage built the first English theatre in London about 1576. This was replaced in 1598 by the London Globe Theatre, a hexagonal structure open at the top with galleries running around, in which most of Shakespeare's plays were acted. The gentry and gallants sat on the stage, on either side, leaving the center free for the actors. There was no scenery, but elaborate furnishings and properties were used. Movable scenery was introduced about 1660. Performances were given in the afternoon by daylight. At about the same time several other theatres, notably the Rose, the Swan, Blackfriars, Hope, Salisbury Court, and Newington, were built.

The first permanent theatre in America was the Southwalk Theatre built in 1766 in Philadelphia, the first floor of brick, the rest of wood. The following year the first permanent theatre in New York was erected on John Street. The years following the building of the first theatres saw the development of the opera house, with the galleries divided into boxes instead of continuous seats; and the variety theatre, with its promenade or parterre. Recent decades have witnessed an extraordinary advance in all devices pertaining to the theatre, particularly in the use of scientific, artistic, and structural design. Perhaps the most radical improvement in the modern theatre concerns lighting effects. The employment of elaborate costumes, scenery, and stage devices has been freely criticised as effected at the expense of the acting, but the spectacular richness of theatrical representations grows from year to year.

In England and the United States the theatres are almost all owned and operated by private individuals or corporations on a purely commercial basis. Subscription theatres vary little from the ordinary commercial theatre, but by means of subscription sales of tickets are able to count on a certain amount of money in advance. An example of this type is the theatre conducted by the Theatre Guild in New York City. Other theatres of semi-commercial nature are the Little Theatres, Community Theatres, Art Theatres, Neighborhood Theatres, and the like.

The Abbey Theatre was founded in Dublin, Ireland, in 1904. Included in the first group of writers associated with the theatre were Russell, Yeats, Synge, Lady Gregory, and Padraic Colum. Among later writers were T. C. Murray, Lennox Robinson, St. John

Ervine, and Lord Dunsany. Outstanding recently have been the plays of Sean O'Casey, whose dramas of realism including *The Plough and the Stars*, treating of the Irish Easter Rebellion, and the famous and delightful *Juno and the Paycock* resulted in great financial success for the Abbey Theatre. When it refused to produce *The Silver Tassie* in 1928, O'Casey left Ireland and his play was later produced in England. His last play, *Within the Gates*, was shown in New York in 1935. In the United States the largest theatres are those of New York and of Chicago.

Theatre Guild, a society organized in New York in 1919, aims to further the artistic growth of the theatre. This organization, which has a large number of yearly subscribers, built its own theatre, costing \$750,000, where it produces plays by both American and foreign playwrights. See THEATRE, and DRAMA.

Thebaine, $C_{10}H_{11}NO_2$, an alkaloid present in opium. It is poisonous, causing severe convulsions by its action on the spinal cord.

Thebes, an ancient Egyptian city, on both sides of the Nile, in 26° N. lat. It existed from very early times, but its greatness dates from the beginning of the New Empire, when Egypt was freed from the Hyksos invaders and the reunion of the empire was directed by Theban princes. For many centuries it was the favorite residence of the Pharaohs, and the seat of the government. At the present day the glory of Thebes consists in its ancient temples. On the e. bank of the river are the famous temples of Luxor and Karnak, while on the w. bank is the Necropolis containing many temples erected as memorials to the kings. East of Medinet Habu are the Colossi of Memnon, two immense figures seated on cubical thrones. They both represent Amenophis III. and originally stood in front of his mortuary tomb; the northern colossus is the famous vocal statue of Memnon, which is said to have emitted a musical note at sunrise, the explanation being that Memnon, who had fallen at Troy, appeared as a stone image at Thebes and greeted his mother, Eos, when she appeared at dawn. The latest discovery at Thebes is the tomb of Tut-ankh-amen, first entered Nov. 29, 1922, by an expedition of the Earl of Carnarvon, under the direction of Howard Carter, a British Egyptologist (see TUT-ANKH-AMEN).

Thebes, city of Boeotia in ancient Greece, was situated on a plain encircled by lofty mountains. Its citadel was the rock called the Cadmea, to which the modern town is now

restricted. There are practically no remains of ancient buildings, though the site of the ancient walls and gates can be traced. The city appears in history when in the Persian wars she took the side of Persia, and after the Greek victory, was severely punished. For the next century she was allied with Sparta, though from 457 to 447 she was subject to Athens. In the Peloponnesian War the Thebans were the bitterest enemies of Athens; but soon after its close in 394 B.C. they joined the Athenians in fighting against Sparta. Alexander the Great utterly destroyed the city, sparing only the temples and the house of Pindar. Cassander restored the city in 315 B.C., but it was of little importance afterwards.

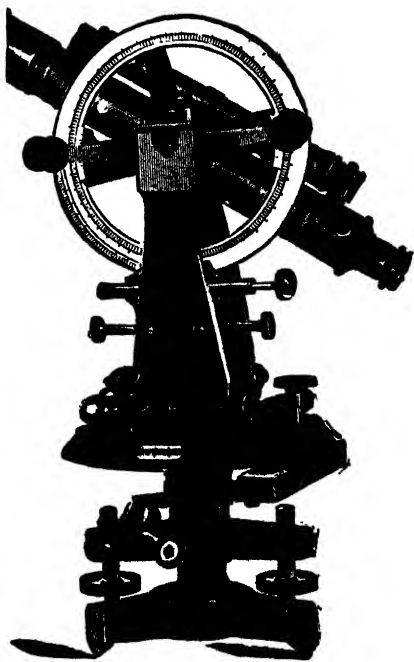
Theft consists in unlawfully taking away or stealing the goods of another. If the possessor, not being also the owner, converts such property to his own use, the crime is that of embezzlement or swindling. To buy or accept, knowingly, stolen goods is not theft, but the receiving of stolen goods is a crime which may be severely punished.

Theism, a name adopted by religious thinkers in the 19th century who aim at establishing belief in an immanent God within nature, rather than a God outside it. More usually, theism is employed as a synonym with natural theology to denote that part of religious belief which reason can prove, in the opinion of those who accept revelation as well as reason. Attention is usually concentrated on the proofs for the being of God.

Themistocles (c. 530-460 B.C.), Athenian statesman, archon in 493 or 492 B.C., when he persuaded the Athenians to make the Piræus their port instead of Phaleron. He fought in the battle of Marathon (490), and in the following ten years was the most influential politician at Athens. In 483 or 482 he persuaded the Athenians to build a fleet of two hundred warships, which proved the salvation of Greece in the Persian War of 480 B.C. He was responsible for the decisive Greek victory at Salamis. In 478 or later he secured the rebuilding of the walls of Athens, and completed the fortifications of the Piræus. Themistocles was one of the greatest geniuses of Greece. From his foresight and decision, he was unequalled in devising counsels on an emergency. He was the founder of the greatness of Athens as a sea power. Other aspects of his character—his lack of scruple and greed of gain—are less admirable; but it is probable that many of the stories which illustrate these defects are the fictions of his foes,

for he was never popular. *Lives* by Plutarch and Cornelius Nepos.

Theocritus (c. 310-265 B.C. or later), Greek pastoral poet, was most probably a native of Syracuse in Sicily. From about 290 to 283 B.C. he was intimate with the poet Philetas in Cos, and with his friends, the poets Nicias, Asclepiades, Alexander, and Leonidas. The next eight years he seems to have lived in Sicily. From 274 to 270 he was in Alexandria, where he formed a friendship with Callimachus, and was poet laureate at the court of Ptolemy II. After that he lived at Cos, and visited Miletus. Theocritus was the father of bucolic poetry as a branch of Greek literature; all later writers in the same style—such as Virgil in Latin poetry, Spenser and Milton in English—have imitated him. But only ten of his idylls are strictly bucolic; others are epic or lyric in character. His language is Doric Greek, and he is famous for the sweetness of his rhythm and style.



Theodolite.

Theodolite, the most important of all instruments used in surveying. Its purpose is to measure angles, both in the horizontal and vertical planes. It is essentially a telescope

mounted so as to be capable of two quite independent movements of rotation, the one about a vertical axis and the other about a horizontal axis. Both movements are measured by suitable graduations on the rims of circular arcs or plates. The instrument when in use rests upon a tripod stand, and is carefully adjusted by means of levelling screws. The fine adjustment is accomplished by means of a tangent screw after the upper horizontal plate has been clamped in approximate adjustment to the lower plate. The graduation on instruments made in America is in ordinary degrees of ninety to the quadrant.

Theodoret (c. 390-457), Greek preacher, and church historian, was born in Antioch and about 423 became bishop of Cyrus. His *Church History* continues Eusebius' till A.D. 428, and he wrote also a *Historia Religiosa*.

Theodoric I., king of the Visigoths from 478 to 451 A.D., was probably the son of Alaric. From 425 to 440 he was often at war with Rome, and was usually successful; but in the latter year he made a lasting peace with the Romans.

Theodoric the Great (A.D. 455-526), king of the Ostrogoths, was born in Vienna, and was educated up to the age of eighteen at Constantinople. In 475 he became king. For some time Theodoric was a loyal ally to the Emperor Zeno; but in 487 he marched on Constantinople. To save himself, Zeno gave Theodoric leave to invade Italy and expel the usurper, Odoacer. Theodoric accordingly entered Italy in 489. His reign was marked by wise government. He kept his soldiers in strict discipline, and Italy soon regained great prosperity. Though an Arian, he was tolerant to Catholicism.

Theodosia, or **Feodosia**, a port on the southeastern coast of Russia, on the Bay of Kaffa, with an excellent harbor. It has a college founded by Alexander I., a museum rich in local antiquities, a Russian cathedral, and an Armenian church built in the fourteenth century. As 'Kaffa of the Genoese,' it was the most famous mediæval port on the Black Sea; p. 38,000.

Theodosius I. (346-395 A.D.), Roman emperor, surnamed The Great, son of the general Theodosius, was a native of Spain. Gratian, emperor of the West, invited him to fill the place of Valens as emperor of the East, and to conduct the war against the Goths. In 382 the Goths submitted, and bodies of them were settled in Thrace, Phrygia, and Lydia. Theodosius then suppressed Maximus, who

had led revolts against Gratian (383) and his successor Valentinian, and the next year entered Rome in triumph. Theodosius was an ardent supporter of orthodoxy against Arianism, other heresies, and paganism; in 381 he prohibited all sacrifices, in temples or elsewhere, and his last edict, in 390, imposed severe penalties, in some cases death, for idolatrous sacrifices. He was a man of a savage temper.

Theogony, the story of the origin of the world and the birth of the gods of Greece; it is most fully told in the *Theogony* of Hesiod.

Theological Education, that branch of education which is concerned with the training of men and women for the ministry. Up to the end of the second century, religious teachers seem to have been self-appointed laymen who promulgated their teachings from place to place. When, however, simple faith crystallized into doctrine, and the Scriptures called for interpretation, some sort of systematic training became essential. Catechetical schools were accordingly founded, and these became seminaries for the clergy. The oldest and most prominent of such schools was that of Alexandria (c. 180 A.D.), made famous by Clement and Origen. Antioch also had a school (c. 290 A.D.) where many illustrious Church Fathers were trained.

The present tendency in theological education in the United States is toward the school forming a part of a university, and separate schools are more and more becoming affiliated with some neighboring university. In general the course is for three years and is offered to any who are qualified, preferably college graduates. The literature of the Bible and its interpretation, systematic dogmatic and practical theology, Church history, and homiletics are the fundamentals required, but an ever increasing demand for a practical Christianity has brought about the addition of courses in ethics, missions, sociology, and religious pedagogy. Post-graduate courses are offered at most of the seminaries and universities. Theological schools are now increasingly interdenominational. See also under the names of separate schools.

Theology, literally 'a speaking about God,' in which sense it is used by Plato (*Rep.* ii. 379 a). From about the fourth century the word was taken over by the Christian Fathers to signify the science of God and his relations to his creation. In its modern significance it embraces Historical Theology; Exegetical and Biblical Theology; Apologetical Theology; Practical Theology, including

homiletics, pastoral theology, liturgies, and theories of church government; Theology proper — that is, Dogmatic Theology, which investigates, defines, and systematizes the doctrines of the church.

Theophany, the manifestation or appearance of deity to man. To the pagan Greeks theophany meant every sensuous sign whereby deity revealed its approach. As now used, it is generally applied to the appearances of God described in the Old Testament. Earlier it was applied to the manifestation of God in Christ.

Theophrastus, (c. 372-287 B.C.), Greek philosopher, studied philosophy at Athens under Plato and Aristotle, and was appointed by Aristotle to succeed him in the presidency of the Lyceum, over which he presided for some thirty-five years. He is said to have had 2,000 pupils, and was highly esteemed at Athens for the excellence of his character. He wrote much on all branches of philosophy.

Theopompus (c. 378-300 B.C.), ancient Greek rhetorician and historian, wrote *Hellenicæ Historiæ*, covering the period from 411 B.C. (where Thucydides left off) to 394; and *Philippica*, a history of Philip's reign from 360 to 336. Only fragments of these works survive.

Theory. As opposed to fact, the term theory indicates the reduction of certain data or facts to a principle, or the exhibition of the facts in their true relations to each other. If the theory enunciates the real relationships that hold among the facts, it necessarily brings us closer to the reality than we were at first, when we had the mere unrelated data before us. Theory may also be opposed to practice; in opposing theoretical to practical knowledge, the contrast between abstract knowledge of principles and concrete familiarity with details is implied.

Theosophical Society, an organization founded in New York City in 1875 by Madame Helena Petrovna Blavatsky, aided by Col. H. S. Olcott, William Q. Judge, and others, the professed objects of which are 'to form a nucleus of the Universal Brotherhood of Humanity without distinction of race, creed, sex, caste, or color; to promote the study of comparative religion, philosophy, and science; and to investigate unexplained laws of nature and the powers latent in man.' The society has no creed and no dogmas. It is not a church; and the only requisite for membership is the acceptance of the first object, as stated above. In 1896 Mrs. Katharine Tingley became president, and the society was

further reorganized as the Universal Brotherhood and Theosophical Society. She and her followers removed to California and founded a colony at Point Loma, near San Diego, while those remaining in New York divided into two bodies.

Theosophy, a word derived from the Greek words *theos*, 'god,' and *sophia*, 'wisdom,' and applied to a philosophical religious system which originated in India. The essential teaching of theosophy is that there is one eternal, unchangeable principle, the root of all manifestation, and that from that one existence comes forth periodically the whole universe. All life is fundamentally one with the life of the Supreme Being and contains in germ all the characteristics of its source; evolution is merely the unfolding of divine potentialities. The theosophist holds that there are seven great planes, the first and densest, the physical; next the astral; and next the mental; above these are four higher spiritual planes.

Man's powers unfold slowly and gradually, and for that reason repeated incarnation is necessary, until he attains to his full perfection. The law of evolution is *karma*, the immutable law of cause and effect. Every action and every thought produces its result, and when man knows and lives by this knowledge he is master of his destiny. Thought is the most powerful agent in the creation of causes; each thought affects the mental body for good or ill, and thus the mentality shown in any one life is the result of repeated thinking in past lives. Theosophy teaches that when man has reached perfection, so that he no longer needs earth-experience, he will pass to spheres of usefulness and glory beyond our conception, whence he need not return to earth unless he chooses to do so in order to help his less advanced brothers. A few more advanced members of the human race have already reached that state and from their ranks have come the great founders of religions and spiritual leaders of humanity. The modern exponent of theosophy was Madame Blavatsky, a Russian traveller who penetrated beyond the borders of Tibet and professed to have received instruction from 'adepts' there and in India. (See THEOSOPIICAL SOCIETY.)

Therapeutics, the science that deals with the measures and agents which the surgeon and physician employ to maintain or to restore health. It was formerly concerned chiefly with the application of medicinal drugs, but with the development of modern med-

icine it has come to cover a wide variety of curative and corrective measures. Among the newer fields of treatment are the employment of vaccines, antitoxins, and antisera, artificially prepared from bacteria and bacterial products, to combat the effect of specific bacterial toxins; psychotherapy, or mental treatment; electrotherapy, including the employment of the X-ray; and dietetic measures. See also MEDICINE, HISTORY OF; HYGIENE.

Therm, the quantity of heat required to raise the temperature of one gram of water from 0° to 1° C. It is also known as a small calory.

Thermae, public baths, specifically those of ancient Rome. These establishments consisted of a number of chambers, some of which were heated by fires burning in a hypocaust below. The *thermae* at Rome, such as those built in Augustus' reign by Agrippa, and others by Nero, Titus, Trajan, Caracalla, and Diocletian, also contained lecture-rooms, porticoes, libraries, and other luxurious appurtenances.

Thermal or Heat Capacity is the quantity of heat, measured in calories, British thermal units, or Joules, that is required to raise the temperature of a unit mass of a substance one degree. The thermal capacity of particular bodies depends, of course, on their mass as well as their material, and is usually expressed as a 'water-equivalent'—as the quantity of water that has equal heat capacity.

Thermit, a mixture of coarsely powdered aluminium and magnetic oxide of iron ('smithy scales,' Fe_3O_4), which when ignited, by setting on fire a pinch of a mixture of finely-powdered aluminium and barium peroxide placed on it, reacts, producing iron and aluminium oxide at an intensely high temperature, approaching $3,000^{\circ}$ C. This reaction has been utilized by Goldschmidt to weld masses of metal together *in situ*.

Thermo-Chemistry is the science dealing with the heat changes that take place in chemical actions, as when solutions are diluted, acids neutralized, or compounds formed or decomposed (the latter class including the important case of combustion).

Thermodynamics, the science which treats of the relations between heat and work. The experiments of Rumford and Davy at the end of the 18th century demonstrated a definite relationship between heat and mechanical energy. In 1843 Joule published his experimental determination of the mechanical

equivalent of heat—the amount of mechanical energy which is equivalent to a given amount of heat. He found that 772 foot-pounds of work were required to raise the temperature of one pound of water one degree Fahrenheit. Subsequent experiments have shown 778 to be a more correct value. In 1824 Carnot introduced the invaluable idea of a cycle of operations, in which the working substance, after having experienced a certain number of transformations, returns to its original state as to density, temperature, and physical condition. In 1848 Lord Kelvin (then Sir W. Thomson) pointed out the value of Carnot's researches, and developed the modern theory of thermodynamics.

Laws of Thermodynamics—First Laws.—When mechanical energy is produced from heat, for each unit of work produced a definite quantity of heat is absorbed; and conversely, if heat is produced by the expenditure of mechanical energy, a definite quantity of heat is produced by the expenditure of a given amount of work.

Second Law.—It is impossible to convey heat from one body to another body at a higher temperature by the agency of a purely self-acting machine (Clausius).

Thermodynamics of a Perfect Gas.—Gases which are extremely difficult to liquefy, such as air, follow very closely certain simple laws, and we speak of an ideal substance which follows these laws exactly as a perfect gas.

Laws of a Perfect Gas.—(1) Boyle's Law.—The volume of a given mass of gas varies inversely as the pressure, provided the temperature be kept constant. (2) Charles' Law.—With the volume constant the change of pressure of a gas is proportioned to the change in absolute temperature. (3) Regnault's Law.—The specific heat at constant pressure is constant for any gas. (4) Joule's Law.—If a gas expands without doing external work, its temperature remains the same. Consult Heck's *Steam Engines* (1916); Stodola's *The Steam Turbine* (1927); Streeter's *The Internal-Combustion Engine* (1927); Morrison's *Diesel Engines* (1923).

Thermograph, or automatically recording thermometer, an instrument for recording the fluctuations in the temperature of the air. The thermometer consists of a curved tube of metal filled with a non-freezing liquid. With a rise of temperature the expansion of the internal liquid straightens the tube; whilst, if the temperature falls, the curvature of the tube increases. The motion is magni-

fied by levers, and is transmitted to a pen which makes a trace on a revolving drum driven by clockwork.

Thermometer, an instrument for determining temperature, invented by Galileo toward the end of 1592. Fixed points for graduation appear to have been first employed by Santorio, a contemporary of Galileo, who used snow and the heat of a candle, dividing the range thus obtained into degrees. The first sealed thermometer was made by Ferdinand II., Grand Duke of Tuscany, about 1654. Mercurial thermometers appear to have been first employed in 1657 by the Accademia del Cimento of Florence. Great improvements in the thermometer were carried out by Fahrenheit from 1706. In 1714 he constructed the thermometer which bears his name, using three fixed points for the division of the scale.

Of thermometers for the registration of minimum temperatures there are two classes, according as the instrument is filled with mercury or spirit. Rutherford's spirit thermometer is the pattern in almost general use. Clinical thermometers for registering the temperature of the human body, are very small and delicate instruments made on this principle. The height of mountains may be determined by the temperature at which water boils, as this depends on the air pressure at the time. The lower the pressure the more readily does vapor liberate itself from the liquid, and ebullition accordingly takes place at a lower temperature as we ascend.

Thermopylae, a pass in Northern Greece, the only approach from Thessaly into Locris. The name ('the Hot Gates') is derived from some hot springs which rose at its eastern end. The most famous battle at the pass was that fought in 480 B.C., by Leonidas and the Greeks against the host of Xerxes, king of Persia.

Thermostat, a thermometer with electrical connections and a device for the automatic regulation of heating units, etc.

Thesaurus. See **DICTIONARY**.

Theseus, in ancient Greek legend the great hero of Athens and Attica, was brought up at Traezen, and while on his way to Athens he killed the robbers Periphetes, Sinis, Sciron, Cercyon, and Procrustes. After his arrival and recognition by his father, Aegeus, king of Athens, he slew the bull of Marathon, and then voluntarily went to Crete as one of the seven youths who, with seven maidens, were annually sent as tribute to Minos to be devoured by the Minotaur. Theseus succeeded

in slaying the monster, thanks to Minos' daughter, Ariadne, who gave him a sword and a clue of thread, by which he made his way out of the labyrinth. On approaching Athens he forgot to change the ship's black sails for white ones, as he had promised his father to do if he succeeded; and Aegeus, seeing the ship afar off from the Acropolis rock, cast himself down, and was killed. Theseus then becoming king led an expedition against the Amazons and carried off their queen, Antiope, or Hippolyta.

Thespis, a native of Icaria in Attica, was the founder of drama. Before his time choruses sang hymns in honor of Dionysus relating his exploits.

Thessalonians, **FIRST AND SECOND EPISTLES TO THE**, two of the Pauline group of letters in the New Testament. According to the traditional view, they were written by the apostle while he was at Corinth, after his visit to Thessalonica on his first missionary journey, and the date generally assigned to them is 52-53 A.D.

Thessalonica. See **SALONICA**.

Thessaly, one of the chief divisions of Greece, bounded on the e. by the Aegean Sea, and on the w. by Mt. Pindus. For the most part it is a plain surrounded by mountains. It was famous for breeding horses. In early Greek mythology it is famous in connection with the Argonauts. In the 4th century B.C. Jason of Pherae made the Thessalians a great power for a short time; but in 344 they were conquered by Philip of Macedon, and thenceforward were subject, first to Macedon and afterward to Rome.

Thetis, in ancient Greek mythology, was a sea goddess, who wedded Peleus. The wedding was attended by all the gods except Eris, who was not invited, and who therefore cast down before the gods the famous apple, inscribed 'To the fairest,' which led to the judgment of Paris and the Trojan War.

Thian Shan. See **Tian Shan**.

Thibet. See **Tibet**.

Thierry, **Jacques Nicolas Augustin** (1795-1856), French historian, born at Blois. In 1825 his *L'Histoire de la Conquête d'Angleterre par les Normands* (4 vols., Eng. trans.), was recognized as a new departure in historical treatment.

Thigh, the thick fleshy portion of the leg between the trunk and the knee. It contains the largest bone in the skeleton, the femur, which articulates with the os innominatum above, with the tibia below, and with the patella anteriorly. The femoral artery tra-

verses the thigh, beginning between the spine of the ilium and the pubic symphysis, and passing downward and inward across Scarpa's space to end in the popliteal space behind the knee. Around the powerful muscles of the thigh is a strong fibrous sheath, which invests the limb like a sleeve.

Thirty-nine Articles, The, or 'Articles agreed upon by the archbishops and bishops of both provinces, and the whole clergy, in the Convocation holden at London in the year 1562,' were drawn up 'for the establishing of consent touching true religion.' Together with the Book of Common Prayer, they form the basis of doctrine and practice upon which the clergy of the Church of England are required to act. Their history is as follows: In 1551 Archbishop Cranmer was directed by the Privy Council to 'frame a book of Articles of Religion.' He prepared forty-two, which were issued in 1552. They were, however, abrogated by Queen Mary. The first Parliament of Elizabeth (1559) restored the English liturgy, and in 1571 the revised articles of 1562 were ratified by the Convocation, and issued by the queen's command. The articles were printed in both Latin and English, both versions being of equal authority. The Protestant Episcopal Church in the United States formally adopted the Thirty-nine Articles in 1801, with omissions and alterations. The American Methodists in 1784 under Wesley's advice adopted 25 of them.

Thirty Years' War, The (1618-48), was due partly to religious, partly to political, causes. The years from 1618 to 1633 form the religious period of the war, during which Bohemia and the Lower Palatinate fell into the hands of the emperor. The offer of the Bohemian crown to Frederick, son-in-law of James I., led to the invasion of Bohemia by the imperial troops, and to the defeat of Frederick (1620). His own dominions were then invaded and seized by Ferdinand, who gave them to Maximilian of Bavaria, the head of the Catholic League. The war then developed into an attempt of the Hapsburgs to form a great Austrian empire, with the Baltic seaports under their control. In 1625 Christian IV., king of Denmark, alarmed at the progress of the imperial forces, came to the rescue of German Protestantism. But he was defeated in 1626, and made the peace of Lübeck in 1629. Meanwhile Wallenstein had almost succeeded in establishing the Hapsburg supremacy over the north of Germany,

as well as over the Baltic. He failed, however, in 1629 to take Stralsund. In July, 1630, Gustavus Adolphus came to the aid of the German Protestants. Ferdinand was unable to resist Gustavus Adolphus, who, in September, 1631, marched into S. Germany. On Nov. 16, 1632, Gustavus won the battle of Lützen, but was himself killed. From 1633 to 1648 the war assumed a political aspect, and resolved itself into a struggle between France, aided by Sweden, and the Hapsburgs of Austria and Spain. The intervention of France proved irresistible. In 1648 the Emperor Ferdinand III. suffered a series of disasters, and finally agreed to the peace of Westphalia (October, 1648). France and Sweden secured important territorial acquisitions, the German princes obtained independence, and the power of the emperor was supreme only in the Austrian dominions. See Schiller's *History of the Thirty Years' War*.

Thistle. See **Pyramus**.

Thistle, a popular name given to plants belonging to the genera *Carduus*, *Cnicus*, *Silybum*, *Echinocactus*, *Sonchus*, *Echinops*, and *Onopordon*. Among the common thistles are the Scotch thistle; the fragrant-flowered pasture thistle; and the tall roadside and field thistles which grow to 7-10 ft. in height. The Canada thistle is a creeping, pernicious weed with small heads. All so-called thistles generally bristle with prickles or spines. The thistle is the national emblem of Scotland.

Thomas, one of Christ's twelve disciples, who doubted of the resurrection till convinced by sight and touch.

Thomas, Augustus (1859-1934), American dramatist, was born in St. Louis. His best-known plays are *Alabama* (produced 1891), *In Mizzoura* (1893), and *Arizona* (1899). His plays dealing with life in various States show ability, by means of quiet realism, and an evident grasp of character, in conveying 'local color.'

Thomas, Edith Matilda (1854-1925), American poet and essayist, was born in Chatham, O. After 1888 she lived in New York City, becoming a frequent contributor of verse and prose to the periodicals. Among her volumes of verse are *A New Year's Masque, and Other Poems* (1885), *The Dancers* (1903), *Cassia, and Other Verse* (1905), *The Guest of the Gate* (1907), *The White Messenger and Other War Poems* (1915). Her prose volumes include *The Round Year* (1886) and *Heaven and Earth* (1892).

Thomas, George Henry (1816-70), American soldier, was born in Southampton co., Va. He served in the Mexican War under General Taylor. At the outbreak of the Civil War Thomas remained loyal to the Union. At Chickamauga, in the fierce battle between Rosecrans and Bragg, he hurled back the continuous assaults of the whole Confederate army. For this splendid feat of arms, the importance of which to the Union cause cannot be overestimated, he was thenceforth known as 'The Rock of Chickamauga.' On the 15-16th of December, in what was perhaps the best planned battle of the war, Thomas defeated and practically destroyed Hood's entire army. For this service he was promoted major general and thanked by Congress.

Thomas, John Charles, American operatic baritone. At first he appeared in musical comedies and operettas, *Maytime* and *Apple Blossom*. Made his recital debut in N. Y. in 1921 and operatic debut in *Aida* in Washington. Since then he has appeared in musical films, has made numerous phonograph records and radio appearances while continuing his operatic career.

Thomas, Joseph (1811-91), American lexicographer, devised a system of pronunciation of geographical names. With Baldwin he edited *A New and Complete Gazetteer of the United States* (1854) and Lippincott's *Complete Pronouncing Gazetteer of the World* (1855). He published separately a *Universal Pronouncing Dictionary of Biography*.

Thomas, Lowell (1892-), author and lecturer, was born in Woodington, Ohio. He was reporter and editor on several newspapers until 1914; instructor at Princeton College, 1914-1916; chief of the civilian mission sent to Europe by President Wilson to make a historical record of World War I, 1916 to close of war; war correspondent; went with the Prince of Wales on his tour of India, 1922; aviation writer and observer, (25,000 mile air journey over 24 countries of Europe, 1926-1927). He was editor of *Asia* magazine, and is a popular 'news commentator of the air' since 1930. Among his books are *With Lawrence in Arabia* (1924); *The Boy's Life of Colonel Lawrence* (1927); *The First World Flight* (1925); *Beyond the Khiber Pass* (1925); *The Sea Devil, European Skyways* (1927); *European Skyways, Raiders of the Deep* (1928); *Lauterbach of the China Sea* (1930); *Stand Fast for Freedom* (1940); *Pageant of Life* (1942).

Thomas, M. Carey (1857-1935), American educator, was born in Baltimore, Md. In 1885-94 she was professor of English and dean at Bryn Mawr College, in 1894-1922 was president of the college, in 1922 becoming president emeritus. Her publications include *The Education of Women* (1900), *Should the Higher Education of Women Differ from that of Men?* (1901); and *College* (1905).

Thomas, Norman (Mattoon) (1884-), American Socialist leader, was born at Marion, Ohio. He was from 1910 to 1918 a minister serving parishes in New York City. He was founder and editor of *The World Tomorrow* (1918-1921); associate editor of *The Nation* (1921-1922). He has been candidate



Norman Thomas.

on the Socialist ticket for governor of New York (1924), for mayor of New York City twice, for President of the United States three times (1928, 1932, 1936). His books: *Is Conscience a Crime?* 1927; *America's Way Out—A Program for Democracy* (1930); *As I See It* (1932); *What Is Our Destiny?* (1944); *Test for Freedom* 1954.

Thomas, Seth (1785-1859), American manufacturer, was born in Wolcott, Conn. He joined two friends in Plymouth, Conn., in establishing the clock-making firm of Terry, Thomas & Hoadley, which later became one of the foremost clock factories in the world.

Thomas à Becket. See **Becket**.

Thomas à Kempis. See **Kempis**.

Thomas Aquinas. See **Aquinas**.

Thompson, Denman (1833-1911), American actor, born near Girard, Pa. From 1854 to 1868 he played character parts in the Royal Lyceum stock company of Toronto, Can. He wrote his sketch *Joshua Whitcomb*, produced as a play in Chicago in 1876, and act-

ed in it until 1886, when he prepared *The Old Homestead*, with 'Joshua Whitcomb' as the leading character. This play ran for four seasons in New York city, and for many years on 'the road.'

Thompson, Dorothy (1894-), writer, newspaper columnist, lecturer, radio commentator. She received her A.B. degree at Syracuse Univ., 1914, then took up social work and drifted into the women's suffrage movement, becoming a newspaper reporter in 1920. She was divorced from her first husband, Josef Bard, in 1926 and married Sinclair Lewis, 1928, divorcing him, 1942. Since 1936 she has been a writer and radio commentator. She has written *I Saw Hitler*; *Dorothy Thompson's Political Guide*; *Listen, Hans*.

Thompson, John Reuben (1823-73), American journalist and poet, born in Richmond, Va. In 1847-59 he was editor of the *Southern Literary Messenger*. Under his management this periodical became the chief literary journal of the South. In 1859 he became editor of the *Southern Field and Fireside*, and afterwards of the *Richmond Record*. In 1863 he went to London, where he contributed to the *London Index* and *Blackwood's Magazine*. From 1872 he was literary editor of the *New York Evening Post*. He wrote many poems, among them 'Patriotism,' 'Virginia,' and 'The Greek Slave.'

Thompson, Seton. See **Seton, Ernest Thompson**.

Thompson, William Hale (1869-1933), American political leader, was active in Chicago politics, 1915-1931, serving as mayor from 1915-1923, 1926-1931. He was prominent in the prosecution of gangsters in his latest term.

Thomson, Elihu (1853-1937), American electrician, born in Manchester, England, and educated in the public schools in Philadelphia. He has taken out nearly 800 patents for electrical devices, the most important being a three-coil armature for dynamos and motors; an induction motor; a constant current regulator for arc-lighting dynamos; a machine for electric welding; electric meters for direct and alternating currents; and magnetic blow-outs for switches and fuses.

Thomson, Sir Joseph John (1856-1940), English physicist, was born near Manchester. He became Cavendish professor of experimental physics at Cambridge University in 1884, and has established one of the most famous schools of experimental physics in the world. The difficult problems connected

with the discharge of electricity through gases were attacked both experimentally and theoretically, and largely through his own researches, as well as those of students working under him, the properties of the electrons and the nature of matter have been investigated there. Thompson has embodied much of his own work in *Recent Researches in Electricity and Magnetism* (1892), and *Conduction of Electricity Through Gases* (1903), *Corpuscular Theory of Matter* (1907), *The Atomic Theory* (1914). He has received many honors from international and American as well as British scientific societies. He was awarded the Nobel prize for physics (1906).

Thoracic Duct begins in the abdomen, close in front of the spinal column at the level of the second lumbar vertebra, as the receptaculum chyli, and running upward to the root of the neck curves a little to the left and arches over to empty itself into the venous blood-stream at the junction of the left internal jugular and subclavian veins.

Thorax. The thorax, or chest, lies between the neck above and the abdomen below, being separated from the latter by the

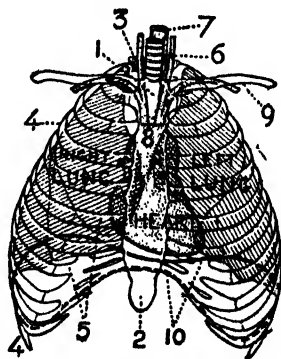


Diagram of Thorax.

1. Top of sternum; 2, ensiform cartilage; 3, first dorsal vertebra; 4, ribs; 5, costal cartilages; 6, trachea; 7, esophagus; 8, aorta; 9, clavicle; 10, median transverse line and line of attachment of diaphragm.

diaphragm. The organs in the thorax are the heart and the lungs. The trachea, or windpipe, and the esophagus, or gullet, pass into it from above.

Thoreau, Henry David (1817-62), Am-

erican essayist and philosopher, was born at Concord, Mass., and was the grandson of John Thoreau, an emigrant from the island of Jersey, who came to New England about 1773. Henry had attended school in Boston, and at Concord, Mass., which became the family home. He graduated at Harvard in 1837. His acquaintance with Emerson, who had become a resident of Concord in 1834, dated from 1837. The same year Thoreau began to keep the daily journals which contain the great body of his literary work. In 1839 his brother John and he took the trip on the Concord and Merrimack rivers which is described in the volume, made up from notes in his journal, entitled *A Week on the Concord and Merrimack Rivers* (1849). From 1841 to 1843 he was an inmate of Emerson's house. Two years afterwards he built the hut on the shore of Walden pond, where he lived alone during 1845-7, giving his time to study and work. During this period he made the notes of his life there, afterward published as *Walden; or, Life in the Woods* (1854). He visited the Maine woods in 1846, 1853, and 1857, and Cape Cod was also the object of some of his sojourns outside of Concord. In 1850 he made a trip through French Canada. From his death to 1906, there was a long series of selections from his unpublished writings, made by various editors, including *Excursions in Field and Forest* (1863), *The Maine Woods* (1864), *Cape Cod* (1865), and *Poems of Nature* (1895). His *Walden*, the *Excursions*, and perhaps the *Letters*, contain the most vital part of Thoreau's thought and individual observation. He is the most philosophic and profound of the nature-writers of America. Biographical books about Thoreau include W. E. Channing, *Thoreau* (1873); F. B. Sanborn's *Thoreau* (1917); Canby, *Thoreau* (1939).

Thorium, Th, 232.5, a metallic element of the tin group, occurring principally in thorite and other rare minerals. It has been isolated by displacement by potassium from potassium fluothorate, and forms an infusible gray metallic powder of specific gravity 11.2. In the U. S. it is largely obtained from monazite which in the commercial form contains from 3 to 9 per cent. of the oxide. The monazite is found for the most part in N. C. Thorium burns brightly in oxygen, and is chiefly important in its oxide, ThO₂, which forms a series of salts. Of these, thorium nitrate, when heated strongly, yields thorium oxide again—a fact made use of in the manufacture

of mantles for incandescent gas light. Thorium also emits radiations and emanations like, though not identical with, those given out by radium.

Thorns. (1.) A name given to various species of *Crataegus*, *Prunus*, *Acacia*, and other genera of shrubs—hawthorn, blackthorn, whitethorn. (2.) The sharp processes, needles, or spines with which many plants are armed.

Thorwaldsen, Bertel (1770-1844), Danish sculptor, born in Copenhagen. He bequeathed his fortune to build and endow the Copenhagen Museum, and left to it his collection of works of art and models of all his statues. His bas-reliefs of *Night* and *Morning* have had a long popularity, and his colossal *Memorial Lion*, carved in the Bernese rocks at Lucerne, is familiar to all travelers in Switzerland.



Bertel Thorwaldsen.

Thoth, an Egyptian divinity, corresponding to the Greek Hermes Trismegistus and the Roman Mercury.

Thothmes, or **Tahutmes**, the name of monarchs of Egypt of the 18th dynasty (1587-1328 B.C.). (1.) THOTHMES I. was a great warrior, who made expeditions into Palestine and Mesopotamia. He penetrated into the heart of Nubia. (2.) THOTHMES III., or 'The Great.' (3.) THOTHMES IV. succeeded Amenhotep II. He is the king who is mentioned on the tablet between the forepaws of the Sphinx.

Thousand Islands, a group (1,700) of picturesque islets in the St. Lawrence R., be-

tween Frontenac and Leeds cos., Ontario Canada, and Jefferson co., New York; they are favorite summer resorts. Some of them belong to Canada, others to New York. Many of them are owned by private individuals and contain costly summer residences and large hotels. They are geologically allied to the Adirondacks.

Thrace, in antiquity, a country in the s.e. of Europe, bounded on the e. by the Black Sea, on the s. by the Sea of Marmora and the Ægean, on the n. by the Danube while on the w. the river Strymon—now the Struma—was usually the dividing line between Thrace and Macedonia. The Thracians spoke an Aryan tongue, more or less akin to Teutonic. They were conquered by Philip of Macedon in 342-341 B.C. Rome's defeat of Macedonia made them her subjects.

Thrasher, or **Brown Thrasher**, a large North American singing-bird (*Harporhynchus rufus*), looking like a thrush, but really allied to the wrens, which is one of the best known and most interesting of our birds. It is larger than a robin, has a very long tail and long curved beak, and is foxy red in general color, with a white breast spotted profusely with bold dart-shaped black markings.

Threadneedle Street, in early times also **Three-needle Street**, city of London, England, named from the circumstance that the Merchant Tailors' Company have their hall in it. It extends from Bishopsgate Street to the Bank of England, 'the old lady in T.S.'

Three Rivers. (1.) Tn., prov. Quebec, Canada, 77 m. n.e. of Montreal, at the junction of the St. Lawrence and St. Maurice rivers. During the summer it is a point of call for steamboats. The falls at Shawanegan, Grande Mère, and other places on the St. Maurice R. furnish an enormous water power. The town has extensive lumber and pulp mills, machine shops, foundries, and manufactories of iron ware, pipes, axes, tools, car wheels; p. 35,197. (2.) City, St. Joseph co., Mich., at the meeting of the St. Joseph, Portage, and Rock rivers. It has good water power, flour mills, planing mills, fur interests, and peppermint-oil works, and manufactures cars, car wheels, tools, agricultural implements, and paper; p. 6,863.

Threshing, consists in separating the grain or seed from the straw. The primitive methods consisted in beating out the grain with a stick or by treading it out with oxen. After the separation from the straw

the chaff and dust were removed by winnowing. The stick was superseded by the flail and treading by the use of the threshing sledge. The flail, which is still in use in some localities of certain countries, consists of two sticks tied together with stout thongs. One of the sticks serves as the handle and the other as the beater. Today practically all threshing is done with threshing machines operated by horse, steam, gasoline, or electric power. Most machines are now equipped with band-cutters, self-feeders, swinging stackers, grain elevators, baggers, weighers, and other labor-saving devices.

Throat. See **Pharynx**; **Epiglottis**; **Tonsils**; **Diphtheria**; **Larynx**.

Thrombosis is the coagulation of fibrin in the heart, blood-vessels, or lymphatics during life. Most thrombi are produced slowly. A thrombus may become organized and adherent to the vessel wall, and it may soften and suppurate, or it may form a phlebolith. Until a thrombus is organized there is grave danger that it may extend or travel to the large venous trunks or even to the heart. If it reaches the brain and plugs a cerebral artery, death commonly results, or paralysis with subsequent brain softening.

Throop Polytechnic Institute, an unsectarian institution for technical training at Pasadena, Cal., founded in 1891 by Hon. Amos G. Throop.

Thrush (*Turdus*), a large genus of songbirds, including many of the best and most familiar songbirds of America and Europe. In most of the true thrushes the breast is more or less spotted at all ages, the beak is moderate, the wing and tail long. North America is richly supplied with these beautiful birds, of which the most familiar example is the robin. Another widely distributed and numerous species is the wood-thrush, whose evening song is perhaps the most melodious and delightful of all the bird-songs commonly heard. An even more exquisite singer—less frequently heard than the wood-thrush because the bird is more retiring—is the hermit thrush, smaller, with the tail very rufous and the spots on the breast wedge-shaped. More familiar, but somewhat irregular in distribution, is Wilson's tawny thrush, or veery, whose strange, bell-like, very melodious song is one of the most striking of American bird-songs. It is of medium size, uniform tawny-red above and white below, with a few faint brownish marks on the chest and sides of the throat. Foremost (in England)

is the song-thrush, throistle, or mavis. Other European members of the genus are those known in England as missel-thrush, red-wing, and fieldfare, while the blackbird is closely allied.

Thucydides (c. 465-c. 400 B.C.), Greek historian, was a native of Athens. In 424 B.C. he was one of the ten *strategi* or chief officials of Athens, and with a colleague (Eucles) was entrusted with the management of affairs in Thrace. However, he failed to prevent Brasidas, the Spartan general, from seizing Amphipolis, though he was in time to secure Eion, its port, and defended it against two attacks. In consequence he was banished from Athens, and remained in exile 20 years. He probably returned to Athens in 403 B.C. As a writer of history Thucydides has never been surpassed. Herodotus is a story-teller; Thucydides is a critical historian. He knows what authorities to use and how to use them. His impartiality is proverbial. The *Hellenica* of Xenophon were written to continue Thucydides' history.

Thule, the name (*Ultima Thule*) given by ancient Greek and Roman writers to the northernmost island known to them in the northern ocean. It was first discovered by Pytheas of Marseilles (c. 330 B.C.); as he only reached it after a six days' voyage from the Orkneys, it is generally held that it was Iceland. By ancient writers generally Thule is used in a vague way to denote the extreme north.

Thumb, Tom. See **Stratton, Charles Sherwood.**

Thumbscrew, an instrument of torture, compressing the thumb or thumbs so as to cause agony. It was used by the Spanish inquisition and in the persecutions of the Scottish Covenanters.

Thunderstorm. Thunderstorms are most frequent in the warmer months. The lightning is explained as due to the sudden rise in potential resulting from the rapid coalescence of small particles into large rain drops. The thunder is the effect of violent vibrations set up in the atmosphere by the lightning, either by the sudden heating or as the result of an explosive effect, whereby alternate sudden compressions and rarefactions are produced.

Thurgau, Swiss canton, admitted into the confederation in 1803; is one of the most fertile regions of Switzerland (corn, fruit, etc.). Area, 388 sq. m.; p. 150,000, mainly German-speaking and two-thirds Protestants. Capital, Frauenfeld.

Thurifer, the incense-bearer at mass, vespers, etc., in the Roman Catholic Church.

Thuringia, a state in central Germany, which was formed by the union of the former Thuringian duchies. Its capital is Weimar; area, 4,536 sq. m.; p. 1,609,000.

Thursday Island, small island of Prince of Wales group, Torres Strait, Queensland, Australia, is the seat of pearl-shell fisheries. Port Kennedy is a government coaling station and a place of call for mail steamers.

Thurston, Robert Henry (1833-1903), American mechanical engineer and educator, born in Providence, R. I. In 1873 he established the first testing laboratory for materials of construction in America, and in 1873-78 was a member of the U. S. board for testing iron and steel. Prof. Thurston invented an improved autographic-recording testing machine, a steam-engine governor, magnesium lamp, and other appliances.

Thuya, a genus of hardy evergreen trees belonging to the order Coniferae. The cones are small, and of the same form as the catkins. The chief species are the North American arbor vitae or white cedar, a graceful tree with spreading branches.

Thwaites, Reuben Gold (1853-1913), American editor and historian, was born in Dorchester, Mass. His most important work was the editing of *The Jesuit Relations and Allied Documents* (73 vols. 1896-1901), a valuable contribution to American history.

Thwing, Charles Franklin (1853-1937), American educator, was born in New Sharon, Me. From 1890 to 1921 he was president and after 1921 president emeritus of Western Reserve University and Adelbert College, Cleveland, O. He is the author of a long list of works, dealing chiefly with education and including: *American Colleges: Their Students and Work* (1878); *College Administration* (1900); *History of the Higher Education in America* (1906); *The American College* (1914); *What Education has the Most Worth?* (1924); *Friends of Men* (1933).

Thyme, a genus of small hardy shrubs belonging to the family Labiatae. Common Thyme (*Thymus vulgaris*) is a small sweet smelling shrub about 6 in. high, with tiny purplish flowers. It is used as a sweet herb in cooking.

Thymus Gland, a ductless gland, which attains full size at the end of the second year of extra-uterine life, after which it dwindles until at puberty it has almost disappeared. It lies partly in the neck below the thyroid.

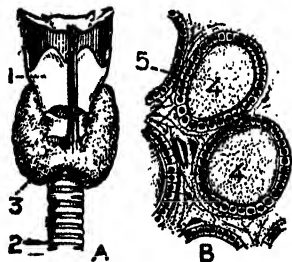
The function of the thymus gland is not yet fully known.



Wild Thyme.

Calyx; 2, corolla; leaf.

Thyroid Gland, one of the ductless glands. It consists of two lobes, one on either side of the upper part of the trachea, connected across the front of the trachea by an isthmus or band of the same glandular structure. It is larger in females than in males, and is richly supplied with blood. The thyroid exercises an influence on the growth



Thyroid Gland.

A. The gland in position. B. Microscopical section of a portion. 1. Larynx. 2. Trachea. 3. Thyroid gland. 4. Vesicles filled with colloid. 5. Epithelium cells.

of the skeleton and on the development and activity of all the tissues, including those of the central nervous system.

Thyssen, Fritz (1873-1951), German industrialist, owner of huge coal and steel interests in the Ruhr. He twice visited this country, lecturing at Harvard and Columbia universities. He joined the Nazis in 1923 and largely financed Hitler's rise to power. After disagreements with Hitler he fled to Switzerland in 1939 and died in Buenos Aires. He wrote *I Paid Hitler* (1941).

Tiahuanaco, ruined town, Bolivia, in the department of La Paz, on a broad plain overlooking Lake Titicaca. Ruins and monuments found here are in some respects the most unique and interesting of all American antiquities.

Tian Shan (Thian Shan), or **Celestial Mountains**, a mountain system of Central Asia, separating the Tarim (Kashgaria) from the Issik-kul and Ili (Balkhash) basin, and extending e. as far as the Desert of Gobi, near Barkul. In the Pamir plateau it connects with the great Tibetan and Indian ranges.

Tiara, the Pope's crown, which, in its triple form, symbolizes his temporal claims,



Tiara, or Triple Crown.

as the keys are the symbol of his spiritual authority. The tiara is formed of gold cloth, encircled by three crowns, and surmounted by a golden globe and cross. There was a tradition that Boniface VIII. added the second, and Urban V. the third of the crowns.

Tibbett, Lawrence (1896-), baritone, made his operatic début in the Hollywood Bowl 1923 and with the Metropolitan Opera Co. 1925. He has made concert tours, acted in moving pictures, and sung on the radio. He won the 1933 award for "good diction on the stage from the Am. Acad. of Arts and Letters, and was chosen "best classical singer" by radio editors for four consecutive years. He founded the Am. Guild of Musical Artists, Inc., in 1935.

Tiber (Lat. *Tiberis*, Ital. *Tevere*), the chief river of Italy, rises among the Apennines, on the eastern border of Tuscany. After a rapid course of about 250 m.—first s.e., and then s.w. towards the level Campagna—it enters the Tyrrhenian Sea by two branches. Of the two branches, the northern, the Fiumicino, artificially excavated in Ro-

man times, is navigable for river steamers to Rome. On the old Tiber, or southern branch, stood the ancient fort of Ostia.

Tiberias, the chief town of Galilee, in ancient Palestine, was situated on the southwestern shore of the Sea of Galilee. It was founded by Herod Antipas in honor of the emperor Tiberius, and was famous for an academy of learned Jews.



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Tiberius: Fishing Boats on the Sea of Galilee.

Tiberius (42 B.C.-37 A.D.), second emperor (A.D. 14-37) of ancient Rome, whose full name was Tiberius Claudius Nero, was the son of Livia and was adopted by the emperor Augustus, whom his mother married in 38 B.C. In 15 B.C. he and his younger brother, Drusus, completed the subjugation of Rhætia and Vindelicia; in 13 B.C. he was made consul, and the following years successfully warred against the Pannonians. Upon the death of Augustus in 14, Tiberius became ruler of the empire. It was during the later years of his reign that the trial and execution of Jesus of Nazareth took place. Tiberius left Rome and removed to Capri, where he remained until his death. His reign was marred by a series of conspiracies and ruthless murders connived at, if not instigated by him, for his personal aggrandizement. He improved the civil service, kept

the army in strict discipline, and managed the finances with great ability and generosity.

Tiberius, emperor of Constantinople (A.D. 578-582), was chiefly occupied with a war with Chosroës, king of Persia, who was severely defeated in 576, and with Mauricius in 580 and 581.

Tibet (Thibet), a country of Central Asia, stretching from the western part of China to Kashmir, with the Himalayas on the s. and the Kuen-lun Mountains on the n. It is the loftiest plateau region in the world. The climate is severe. The cold is intense and, owing to the elevation, the air is so rarefied that it often causes nausea and mountain sickness. Wounds heal slowly for lack of oxygen. Violent and sudden storms occur, and extremes of heat and cold follow close upon each other. The northern flora is of the Arctic alpine variety; the southern comprises fruits, a variety of trees, walnut, willow, elm, and birch, and a few cereals. The fauna includes the yak, antelope, kyang or wild ass, wolf, musk deer, snow-leopard, marmot, bear. Among the minerals occurring in Tibet are large quantities of gold, salt, iron, silver, copper, and lead. There are a few factories in the s. and e., in which metal work, wooden ware, rugs, and pottery are produced. The people of Tibet, who are estimated at from 1,500,000 to 6,000,000, are Turko-Mongols. They are short and broad shouldered, with black hair and almost white skin. The prevailing religion is Lamaism, a corrupt form of Buddhism mixed with superstitious devil worship. The priests or lamas are numerous and powerful, and huge lamaseries are found throughout the country.

Tibet is under the suzerainty of China. The head of the government is the Dalai Lama. Lhasa is the capital. Owing to its unapproachableness and the consequent mystery enshrouding it, Tibet has from time long past been the goal of many exploring expeditions. In 1277 Marco Polo travelled through the wild countries on its eastern borders. Thomas Manning was the first Englishman to reach Lhasa, the 'Forbidden City.' Sven Hedin, a Swede, made three journeys through the country (1896, 1899-1902, 1906-08), but never reached Lhasa. Younghusband's armed mission of 1904 (see *History*) penetrated to Lhasa, and the Mount Everest Expedition (1921-2), by special agreement of the Tibetan government, was permitted to enter the forbidden city.

History.—The early history of Tibet is shrouded in darkness. In the 13th century (1270), the conqueror of China, Kublai Khan, subdued eastern Tibet and made Phagspa, the leading lama, ruler over the country. This seems to have been the formal beginning of the system of lama rule under Chinese suzerainty which, with some interruptions, has continued to the present day. In 1890, a treaty was concluded between Great Britain and China, defining the boundaries between Tibet and Sikkim and (1893) establishing trade regulations. At length, it having become apparent that the Dalai Lama was negotiating with Russia, and rumors having been circulated that China was secretly planning to hand over Tibet to Russian authority, an armed British mission, under the command of Colonel Younghusband, was dispatched (1904) to Lhasa. This mission resulted in the Anglo-Chinese convention of 1906. A convention with Russia in 1907 recognized the suzerainty of China in Tibet. Nga-Wang Lop-sang Tup-den Gyatso, the Dalai Lama since 1893, died in December 1933. He was the 13th in succession to that office. His successor is a child supposed to be the 14th reincarnation of Buddha, born the same moment the Dalai Lama died. He is Tanchu, descendant of nomad herdsmen, who was not discovered until 1939. Until the new ruler is 18 years old, the head Lama of Reting Lamasery will assume the government of Tibet. In 1933 two monks of the Hospice of St. Bernard, founded a hospice on the borders between Tibet, India and China. In 1950 Com. Chinese troops invaded Tibet, who appealed vainly to U.N. In 1951 Com. regime took over. Consult C. Bell, *People of Tibet* (1928); *A Conquest of Tibet*, Sven Hedin (1934); Theos Bernard, *The Land of the Thousand Buddhas* (1940).

Tibia, the inner and larger bone of the leg, below the knee. Also the name of the pipe or flute used by the ancient Greeks and Romans. The tibia dextra (the bass instrument) was held in the right hand, the tibia sinistra (the treble instrument) in the left.

Tibullus, Albius (54-18 B.C.), elegiac poet of ancient Rome, belonged to a family of Pedum, between Tibur and Præneste. In 31 B.C. he accompanied Messala into Gaul.

Tichborne Case, the longest trial recorded in England, having to do with the possession of Tichborne, an estate in Hampshire. Roger Charles Tichborne, eldest son of James, afterwards tenth baronet, was born in 1829,

sailed to Valparaíso in 1853, and the next year sailed from Rio de Janeiro in the *Bella*, which foundered at sea with all hands. The baronetcy and estates passed to his brother, Alfred Joseph Doughty-Tichborne. Clinging to the hope that her son was still alive, Roger's mother advertised unguardedly. In these circumstances, a butcher in Australia claimed to be the lost Sir Roger, saved from the wreck of the *Bella*, and as such was received by the infatuated mother. The claim was opposed on behalf of a son of Sir Alfred Tichborne. On March 6, 1872, the 103d day of the trial, the claimant was non-suited. Then, arrested as Orton, on a charge of perjury, he was brought to trial, and on February 28, 1874, the 188th day of the new trial, sentenced to fourteen years' imprisonment. Orton died in 1898.

Ticino, canton, Switzerland, in the southern part, bordering on Italy, with an area of 1,088 sq. m. It is mountainous and picturesque, and on its borders are Lake Lugano and Lake Maggiore. The climate is delightful, and the canton is the greatest wine-producing district in the country; p. 161, 838.

Tick, a parasite of terrestrial animals, constituting a family of Acarina. The body is mitelike; there are four legs, ending in claws, which serve for purposes of attachment to the host, and the mouth bears a long beak furnished with recurved hooks. Ticks cling to the hair, etc., of the host by the legs, and puncture the skin with the beak. In some cases they drop off as soon as they have gorged themselves with blood, while in others they remain more or less permanently attached.

Ticket-of-Leave, under the English penal system, a license to be at large, which may be revoked at any time for bad conduct. It is similar in effect to a parole or suspension of sentence in the United States.

Ticknor, George (1791-1871), American literary historian, was born in Boston. He passed two years at Göttingen, and two years in various other cities of the Continent (1815-19), studying literature, especially that of Spain and Portugal. On his return to America, bringing with him a valuable library, particularly strong in the Spanish department, he assumed the chair of modern literature at Harvard. His *History of Spanish Literature* first appeared in 1849.

Ticonderoga, village, New York, in Essex co. The ruins of Fort Ticonderoga, built afterwards tenth baronet, was born in 1829, by the French in 1755, rebuilt, are near the

village, and its fine scenery and historic environment have made it a popular resort; p. 3,402.

Ticonderoga, Fort, a fortification on the shore of Lake Champlain. It was built by the French in 1755, at the beginning of the French and Indian War, and was called Carillon (chimes). Here the French general, Montcalm, made his headquarters in 1757. On July 8, 1758, General Abercrombie of the British forces, with a powerful army, made an unsuccessful assault upon the fort, but in 1759 General Amherst invested it with 12,000 men and forced its evacuation and that of Crown Point as well. After the close of the French and Indian War only a small garrison was maintained, and at the beginning of the Revolution Massachusetts gave authority to Benedict Arnold to raise a force of 400 men for its capture. He was anticipated, however, by Ethan Allen and his 'Green Mountain Boys,' who surprised and took the place without resistance on May 10, 1775.

Tidal Wave. Tidal waves are to be distinguished from tide waves or the general advance of the water to the shore. Tidal waves are now regarded as due to re-inforcement of sea waves by others of like phase; and also as caused by earthquakes or breaks in the ocean bottom. A great mass of water is given progressive motion out and away from the line of fracture of the earth's crust. These tidal waves are often very destructive.

Tides. Tides are usually defined as fluctuations in the level of the ocean or of rivers emptying into the ocean, caused by variation in the attraction of moon and sun. As a matter of fact, there are land and air tides as well, due to the influence of gravitation, but these are small and, unlike the water tides, not easily determined. The oceanic or true astronomical tides are periodic and the changes of level are nearly uniform, though near the shore, local conditions will determine the height of the incoming water and the depth of the low tide. The rising of the water or inflow is called the flood tide, and the outflow or falling of the water is called the ebb. Tides do not rise to a fixed height; but at intervals of a fortnight, that is, with the new moon and the full moon, the water reaches levels higher than at other times. These high tides are called *spring tides*. The alternating tides of maximum lowness are called *neap tides*, the word meaning low or lacking. In the United States the U. S. Coast and Geodetic Survey is officially charged

with the preparation of data on tides and tidal currents. The prediction of tides for the U. S. Coast and Geodetic Survey's *Tide Tables* is made by means of a remarkable machine, which was designed and constructed for the purpose in the office of the Survey. This machine is a combination of the best parts of Lord Kelvin's and William Ferrel's tide-predicting machines, together with many original improvements.

Tientsin, city and treaty port, China, in the province of Chi-li, on the right bank of the Pei-ho, at its junction with the Grand Canal. Until 1901 the city was surrounded by walls, built in 1403, but following the Boxer uprising these were destroyed. In 1860 Tientsin was made a treaty port. In 1900 during the Boxer rebellion the foreign residents were besieged for nearly a month, until the city was taken by the allied troops, following which it was governed until 1907 by an international commission; p. 838,629.

Tierra del Fuego, group of islands at the southern extremity of South America, consisting of one large island, several much smaller ones, and many tiny islets.

Tiffany, Charles Louis (1812-1902), American merchant, was born in Killingly, Conn. He went to New York City in 1837, and established with J. B. Young the stationery firm of Tiffany & Young, at 259 Broadway. The firm soon became noted as jewelry importers, and in 1847, having removed to 271 Broadway, began the manufacture of jewelry. They benefited greatly by extensive buying in Paris during the decline in the price of diamonds in the European troubles of 1848, and were soon recognized as one of the world's leading diamond houses. After several changes of name, the firm, in 1851, became Tiffany & Co.

Tiffany, Louis Comfort (1848-1933), American artist and designer, son of Charles L. Tiffany, was born in New York City. He became interested in the construction of colored glass windows, and not only succeeded in reproducing many of the finest effects that had been obtained in the past, but also discovered new formulas by which he could make glass unlimited in its range of color and texture—the Tiffany 'favril glass.' In 1878 he organized a company for the purpose of promoting the decorative arts in America which was the foundation of the business known as the Tiffany Studios. He has executed many works in glass and mosaics for memorial windows, notable among

which are the mosaics in the Cathedral of St John the Divine, New York City. In 1918 Mr. Tiffany established the Louis Comfort Tiffany Foundation for art students at Oyster Bay.

Tiflis (Tbilisi), prov., Georgia, U.S.S.R. Transcaucasia; area ab. 23,000 sq.m. The principal occupations are agriculture in the lowlands and grazing on the mountain slopes; p. about 1,473,308.



Samuel J. Tilden.

Tiflis, capital and chief city of Georgia, in the province of Tiflis. Upon the establishment of the Transcaucasian republic in 1918, Tiflis was made the capital, and when, soon after, Georgia became a separate state, it became its capital; p. 519,000.

Tiger (*Felis tigris*), a large member of the cat family, closely related to the lion, to which it is little inferior in strength. The general ground color is tawny yellow, the under parts being white; head, body, and limbs are transversely striped with black, and the tail is ringed with black. The tiger is widely distributed throughout Asia, being especially abundant in India, though absent from Ceylon, and also from the plateau of Tibet. Typically a jungle animal, the tiger lives chiefly in forest regions or in grassy plains. It appears to be a well established fact that once a tiger has taken to man-eating, it confines itself afterwards to human food. In many parts of India the death-roll from this cause is still large.

Tiger Beetle, a general name for the members of the family Cicindelidae, of which there are more than a thousand species, more abundant in tropical than in temperate or cold climates. They are handsome insects of extremely active habits, commonly green or yellow, adorned with stripes or spots.

Tiglath-pileser, the name of three Assyrian kings. **TIGLATH-PILESER I.**, who reigned from about 1120-1105 B.C., was the first of the great Assyrian conquerors. He created a great kingdom, which included the whole district of the Tigris and Euphrates as far as Babylon, Western Armenia, and Eastern Asia Minor as far as Pontis. **TIGLATH-PILESER II.** (c. 950-930), is comparatively unknown. **TIGLATH-PILESER III.**, who reigned from 745-727 B.C., was one of the greatest of Assyrian conquerors. During his reign, not only was Babylonia definitely subdued, but he reconquered Armenia, Syria, Media, Chaldaea, Damascus, Judaea, and Gaza.

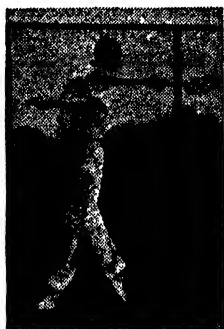
Tigranes, or **Dekran** (c. 140-56 B.C.), king of Armenia, aided his father-in-law, Mithridates, against the Romans. He built a magnificent royal city called Tigranocerta on the borders of Armenia and Mesopotamia, to which he transplanted many Greeks and Syrians. Tigranes surrendered to Pompey, who had formed an alliance with Tigranes' son. Pompey restored his throne and he ruled for some ten years as a vassal of Rome.

Tigris, river, Asiatic Turkey, originates in two head-streams—the Shat, or w.; and the Bitlis or Bohtan-su, or e. The united stream flows s.s.e. past Mosul, Samara, and Bagdad to join the Euphrates at Kurna. Beside it lie the sites of the ancient cities of Nineveh, Nimrud, Seleucia, and Ctesiphon.

Tilden, Samuel Jones (1814-86), American statesman, born in New Lebanon, N. Y. He was the originator of the system of railroad 'reorganization' and 'consolidation,' and at one time or another many of the railways then existing in the country passed through his hands. Although his stand during the Civil War was not exactly what lovers of the Union could have wished, this did not prevent him from receiving in 1866 the chairmanship of the Democratic state committee in New York. In this capacity he was more or less associated with unscrupulous leaders of the party in New York city; but after the exposure of the Tweed Ring by the N. Y. *Times*, in 1871, he at the eleventh hour threw himself into a desperate struggle against the ring, and it was partly through his efforts that the organization was broken up. Despite the opposition of Tammany Hall, Tilden in 1874 became the party's candidate for governor, and he was elected by a plurality of about 50,000. As governor he waged a relentless war upon the so-called 'Canal Ring,' or his political history, see UNITED STATES

HISTORY. Tilden left a will bequeathing about four-fifths of an estate appraised at more than five millions 'to establish and maintain a free library and reading-room in the city of New York.' Tilden's relatives, however, contested the will, and after long litigation a compromise was agreed upon whereby about \$2,000,000 was devoted to the purpose which Mr. Tilden named. The sum was afterwards combined with funds furnished by trustees of the Astor and the Lenox foundations for the establishment of an institution to be known as the New York Public Library.

Tilden, William Tatem, Jr. (1893-1953), tennis player, was born in Philadelphia, Pa. In 1921, he began newspaper work in Philadelphia, and since then has also written for syndicates and magazines. In 1924 he entered the moving picture business. From



William T. Tilden, Jr.

1920, when he won from William M. Johnston, he was tennis champion of the U. S. and of the world until 1925. He was again champion of the U. S., Switzerland, and the Netherlands in 1929. He has been a member of the Davis Cup Team since 1920. Since 1931, when he became a professional tennis player, he has won several American professional tennis championships. His works include several books, and a play, *They All Want Something* (1926).

Tile. A term applied to (1) clay products of slablike form used for covering roofs, walls, floors, and (2) those of cylindrical or semi-cylindrical cross-section used for drainage purposes. *Roofing tile* are made in the following shapes: *Shingle-tile*, of flat form, and laid on the roof in the same manner as slate. *Roman tile*, of semi-circular cross-section, laid with the convex and concave side

up alternately, so that one straddles two others. This is a type much used abroad. *Interlocking tile*, having grooves and ridges which fit into each other when the tiles are laid with an overlap. *Floor tile*: These are flat tile of square, rectangular, hexagonal, or octagonal outline. They must necessarily be hard to resist abrasion, and dense to prevent the absorption of dirt and moisture. They are made in many colors, some of them artificial. *Wall tile* are quite different from floor tile in both the character of the body and style of decoration. The body, which is a mixture of white-burning clays and flint, is, after burning, very porous and of moderate hardness. *Drain tile*. Three types of these are recognized: *viz.* horseshoe tile, of horseshoe-shaped cross-section; sole-tile, cylindrical with a flat base; and pipe-tile, of cylindrical cross-section.

Tilefish, a fish (*Lopholatilus chamaeleonticeps*) discovered in 1879 living in the western Atlantic at a depth of 60 to 80 fathoms, apparently over a wide area, and in enormous numbers. It is related to the codfish and belongs to the family Malacanthidae. It seems ordinarily to be from 10 to 20 pounds in weight, is handsomely colored, and excellent eating.

Tillage, or Cultivation, denotes the various methods of securing a tilth suitable for promoting the growth and development of cultivated plants. The cultivation of retentive or clay soils is by far the most difficult. Every means is taken to lighten their heavy nature, as by the application of long manure, and by working them when dry. Light soils require an almost opposite treatment, such as heavy rolling, the application of short manure, and endeavoring to produce a compact or firm condition. The depth of cultivation must depend upon the nature of the subsoil. It is often injurious to mix poor chalk, gravel, or clay with the richer surface soil. The deepening of soil ought to be done gradually.

Tillman, Benjamin Ryan (1847-1918), American politician, was born in Edgfield co., S. C. As the candidate of the farmers he secured the Democratic nomination for governor in 1890, his success marking the end of the old aristocratic regime in S. C. He was elected to the U. S. Senate in 1895, re-elected in 1901, and in 1906 received the Democratic nomination for another term at the party primary. He became well known in the Senate for his radical opinions, especially on the

negro question, and for his vehement method of stating them.

Tilly, Johann Tserklaes, Count of (1559-1632), imperialist general, became the commander of the forces of the Catholic League of Germany. At the outbreak of the Thirty Years' War he defeated Frederick, elector palatine, in the battle of the White Hill at Prague (1620), and recovered Bohemia for the emperor. The attempt of Christian IV. of Denmark to intervene on behalf of the Protestant cause was cut short at the battle of Lutter (Aug. 27, 1626). Tilly's merciless sack of Magdeburg (May 20, 1631) was a blunder and a crime; and on Sept. 17, 1631, he was totally defeated by the Swedish king. Gustavus of Sweden mortally wounded Tilly in the battle of the Lech in Bavaria, April 5, 1632.

Timbrel, a musical percussion instrument, used by the ancient Hebrews, and supposed to have been a kind of tambourine.

Timbuktu, or **Timbuctoo**, headquarters of the First Military Territory, French Sahara, is situated 9 m. n. of the Niger, in 16° n. and 5° w. It is a great caravan center, linking the Niger basin with Morocco, Algeria, Tunis, Tripoli, and Egypt. The French took possession early in 1894, and their occupation was acknowledged by Great Britain by the convention of June 14, 1898. The fortifications both at Timbuktu and at the river port, Kabara, have been modernized and strengthened; p. 12,000.

Time, our perception of the sequence of events, measured by the regular recurrence of any noted phenomenon. The primary time unit is the period of the earth's rotation, by which the alternations of day and night are occasioned. It is employed in three different methods, giving rise to the systems of sidereal, mean solar, and apparent solar time. Sidereal time is employed only for astronomical purposes. It is the hour-angle of the vernal equinox, and its noon, marked by the transit of that point across a given meridian, coincides with apparent solar noon only once a year, about March 21. Mean solar time is the hour-angle of an imaginary sun travelling uniformly along the celestial equator. It is measured by the intervals between the successive transits of the assumed body, which are of identical length, and nearly 4 min. longer than the corresponding sidereal intervals. Apparent solar or sundial time is the hour-angle of the real sun; but its units, or the intervals between two apparent noons, vary

continually, and the practical inconveniences thence resulting have led to its virtual disuse. The maximum divergence of apparent from mean solar time amounts to about 16 min. The most accurate determinations of time are made by observing the transits of 'clock-stars.' These are a collection of standard stars, the absolute right ascensions of which have been fixed with refined care. The method commonly employed at sea is by a single altitude of the sun or of a *Nautical Almanac* star, the observer's latitude being known. Its altitude having been measured with a sextant and the time noted by the chronometer, its hour-angle can be computed; and this, corrected for the equation of time, gives the true mean time at the instant of observation, and, by comparison, the error of the chronometer on local time. And the error, supposing the chronometer to show true Greenwich time, is equivalent to the observer's longitude. Local time varies with longitude one hour of advance or retardation corresponding to 15° of east or west displacement. In moving eastward the hours are anticipated. To remedy the confusion arising from these diversities, a system of universal time has been introduced. See **TIME, STANDARD**. The distribution of time is one of the most important duties of national observatories, and the U. S. Naval Observatory at Washington supplies correct time for the entire U. S. through the agency of the telegraph companies. At Greenwich, near London, the errors of the clocks are determined twice daily; hourly time-signals are sent out over the metropolitan area; at 10 A.M. they are dispatched by telegraph to the General Post Office for transmission throughout the kingdom.

Time, Standard. Time based on a certain definite meridian adopted as the time meridian for a more or less wide extent of country in place of the various meridians on which local mean time is based. Standard time meridians are selected at such intervals that they will not cause any marked variation from the true local mean time, and the most convenient arrangement is to have them exactly one hour apart, as in the United States, where the meridians 75°, 90°, 105° and 120° w. from Greenwich are the time meridians of Eastern, Central, Mountain, and Pacific standard time respectively, so that when it is noon at Washington and the other Eastern cities, it is eleven o'clock at Chicago, New Orleans, and other cities of similar longitude, ten o'clock from Dakota to Arizona and New

Mexico, and nine o'clock at all points on the Pacific coast. Standard time is used not only in the United States and Canada, but in large number of foreign countries, and is based on Greenwich, England, as the prime meridian.

Timoleon (c. 400-337 B.C.), of Corinth in ancient Greece, was called into prominence in 344 B.C. by a request from Syracuse to its mother city Corinth for assistance against its tyrant, the younger Dionysius, and against the Carthaginians. Timoleon was appointed commander of the relieving forces. Timoleon expelled Hicetas, the Carthaginian general, from the whole of Syracuse, and set about restoring the city's freedom. The affairs of Syracuse settled, Timoleon put down the tyrants in other Sicilian cities. But in 339 B.C. the Carthaginians sent a vast armament, landed at Lilybæum, and started to march across Sicily to Syracuse. Timoleon met them, and defeated them at the river Crimissus. Messina and all other cities still governed by tyrants were liberated, and deserted cities such as Acragas and Gela were restored. His work done, Timoleon retired into private life, living, blind, near Syracuse.

Timon, of Athens, the misanthrope, lived in the 5th century B.C. On losing his wealth, he was so disgusted with the ingratitude shown to him by his former friends that he shut himself up in a lonely tower, refusing to see anyone except Alcibiades.

Timor, the largest and most easterly island in the Lesser Sunda Is., Indonesia. Portuguese owns e. part; Holland, w. part.

Timoshenko, Semyon Konstantinovich (1895-). An officer in the Imperial army, he joined the Red army in 1917. In World War II he led the Russian defense armies against the Nazis.

Timothy, or **Timotheus**, a younger companion of the apostle Paul, was the son of a Greek father and a Jewish mother, and was converted by Paul. He joined the apostle on his second missionary journey, and became his most attached colleague. He was left in charge of the church at Ephesus, where he is reputed to have been martyred.

Timothy, The First and Second Epistles of Paul to, together with Epistle to Titus, are known as the pastoral epistles, being largely composed of counsels regarding the oversight of churches. The first epistle warns Timothy against erroneous speculations and ascetic tendencies, probably Gnosticism in its beginnings; gives directions regarding public prayer, the deportment of

women, the appointment of bishops and deacons; and touches many points of Christian character and conduct. The second epistle also speaks of defections and heresies, contains fatherly admonitions, and, in the concluding chapter, reveals the thoughts and feelings of the apostle in face of his imminent death.

Timothy Grass, a hard, somewhat coarse grass (*Phleum pratense*), which is extensively cultivated as an ingredient of permanent pasture. It does best in rather heavy soil.

Timrod, Henry (1829-67), American poet, born in Charleston, Va., founded *Russell's Magazine*, in which many of his poems appeared. As a poet he was distinguished chiefly for the power and quality of his lyrical verse. Among his best poems are 'Carolina' and 'A Cry to Arms.'

Tin, Sn, 119.0, a metallic element found in nature chiefly as the mineral cassiterite or 'tinstone,' SnO₂. The ore is concentrated by washing, then roasted to oxidize and remove sulphur and arsenic, and smelted with powdered anthracite in a reverberatory furnace. The reduced metallic tin is tapped off and melted out from the impurities, being further refined by stirring the molten metal with poles of green wood, by the gases of which the remaining impurities are carried to the surface. Tin is a silver-white, malleable, and somewhat ductile metal, but is of low tenacity and of highly crystalline structure. Tin has a specific gravity of 7.3, melts at 232° C., boils at 1,500° C., and is a poor conductor of electricity. It takes a high polish, and being but little acted on by the air, is largely used to coat other metals to prevent them from rusting or corroding. Tin is also used to line copper vessels and lead pipes, to prevent these poisonous metals from dissolving and contaminating foods and water. Heated in air, tin rapidly oxidizes, forming tin dioxide, SnO₂, a white insoluble powder that is used for polishing under the name of 'putty powder.' Tin dioxide is of feebly acid properties, forming stannates with basic oxides, and of these sodium stannate is used in calico-printing.

Tinctures, extracts of drugs prepared by macerating the material in alcohol for some days and straining off the clear solution, percolating the solvent slowly through the substance containing the drug, or by simply dissolving the drug directly. Laudanum, tincture of arnica, and tincture of iodine are typical examples.

Tinplate, a sheet of wrought iron or mild steel that has received a thin coating of

tin by immersion in the molten metal to protect it from rust. But as soon as a portion of the protective covering is worn off, the iron, if exposed to moist air, rusts more rapidly than ever.

Tinsel, a material consisting of very thin sheets of brightly polished metal foil. Tinsel is used for the ornamentation of Christmas trees.

Tintagel, village, England, in Cornwall, 5 m. n.w. of Camelford. There are extensive ruins of an ancient castle, the traditional birthplace of King Arthur.

Tintern Abbey, a ruined abbey in Gloucestershire, England, near the Wye, 5½ m. n. of Chepstow. The ruins are remarkably picturesque.

Tintoretto, properly **Jacopo Robusti** (1518-94), Italian painter, was born probably in Venice. It is said that at a very early age he showed artistic talent and is supposed to have studied a short time under Titian, but was soon dismissed because of jealousy. His aim, written on the walls of his studio, was to 'attain to the design of Michelangelo and to the color of Titian.' He worked very rapidly and attained to great excellence in his effects of light and shade and in portraiture, his flesh tints being admirable. His *Paradise*, in the Ducal palace in Venice, is the largest picture in canvas in existence. Among the best of his works are *The Crucifixion*, *Esther before Ahasuerus*, *St. George and the Dragon*, *The Miracle of St. Mark*, *Bacchus and Ariadne*, *Mars and Minerva*, and *The Last Supper*.

Tippecanoe, Battle of, a battle fought on Nov. 7, 1811 on the Tippecanoe River in what is now Tippecanoe County, Indiana, between about 800 militiamen and regular U. S. soldiers under Gov. W. H. Harrison of the Territory of Indiana, and a much larger force of Indians under White Loon, Winnemac, and Stone Eater. The battle was due to the excitement among the Indians owing to the gradual acquisition of their lands by the U. S. government—an excitement fomented by Tecumseh. Tecumseh was not present in person, but the defeat of the Indians did much to weaken his hold on the Indian tribes of the West and Southwest and very greatly weakened the influence of the 'Prophet'; on the other hand, it made General Harrison a popular hero, and in the presidential campaign of 1840 'Tippecanoe and Tyler too' was a popular campaign cry.

Tipperary, inland county, Eire, in

Munster province. The principal rivers are the Shannon, Little Brosna, Nenagh, and Suir. Agriculture is the chief industry. There are many remains of ancient castles and ecclesiastical buildings.

Tirana, city, Albania, picturesquely situated at the foot of wooded hills. It has many gardens and olive groves and is adorned with numerous mosques. A majority of the inhabitants are Mohammedans. It was seized by Italy, 1939; p. about 30,806.

Tiresias, in ancient Greek legend, a soothsayer, a native of Thebes. He was the adviser of Oedipus, of the latter's sons, and of Creon; and it was to visit him that Odysseus descended into Hades.

Tiridates, the name of several Parthian and Armenian kings. Tiridates III. made Christianity the state religion (294).

Tirpitz, Alfred von (1849-1930), German naval officer, was born in Küstrin. In 1865 he entered the German navy and rose through the grades to that of admiral in 1903. During the war he declared a war zone about the British Isles, to mark which he instituted a submarine blockade, and as a result many neutral as well as belligerent vessels were destroyed, notably the *Lusitania*. In 1921 he entered the Reichstag as German National Deputy, where he played an influential part till 1928.

Tirso de Molina, pseudonym of **Gabriel Tellez** (1571-1648), Spanish dramatist. His most famous tragic play is *Don Juan (El Burlador de Sevilla)*, but his comedies are extremely sparkling, and are still popular on the stage. Several of his plays were appropriated or utilized by Calderón.

Tiryna, one of the most ancient fortresses in Greece, was situated in Argolis, at the head of the Gulf of Nauplia; 6 m. s.e. of Argos, and about a m. from the sea. The name originated with the prehistoric people who were dispossessed by the Greeks. The history of Tiryns is almost entirely legendary. The ruined Citadel of Tiryns stands on a limestone rock, which rises 90 ft. above the surrounding plain. The rock was shaped into three levels, the highest and most southerly level being occupied by the Palace. The plan of the Palace is strikingly similar to the temples of ancient Egypt. Pottery has also been found, with pictures of animals, and in one case even of men; while terra-cotta figurines of various kinds, and of primitive character, seem to have had a religious use as votive offerings. The best specimens of pottery are of

the same kind as the best found at Mycenæ, and date the existence of the fortress at from 1500 to 1100 B.C.

Tissot, James Joseph Jacques (1836-1902), French painter, was born in Nantes. Following a stay of four years in Palestine he painted a series of 365 small water colors illustrative of the *Life of Our Lord Jesus Christ*, which created a profound impression. A subscription for the purchase of these pictures was started in the United States in 1900, and that year the collection became the property of the Brooklyn Institute of Arts and Sciences.

Tissue, in biology, is a term applied to any structure composed of cells and cell products. The functions and characters of the predominant cellular units determine the nature of a tissue, the four elementary types being epithelial, connective, muscular, and nervous.

Tit, or **Titmouse**, a popular name given to the members of the sub-family Parinae (family Paridae), embracing about 100 species and varieties. They are passerine birds of small size, frequenting trees. North America has 13 species. The prevailing color is gray and white, with black markings and some blue or chestnut, but never barred, streaked, or spotted. The most familiar species is the black-capped titmouse or chickadee (*Parus atricapillus*), whose exclamatory call and plaintive, whistled note are heard in the spring in all the more northerly parts of the country. This species is characterized by its brownish-gray mantle and intensely black cap and throat. All the American chickadees make nests of soft material, generally in holes in old stumps, abandoned woodpeckers' burrows, and similar places, and lay from 5 to 8 eggs, white speckled with cinnamon red.

Titan, Saturn's sixth and largest satellite, discovered by Huygens in 1655.

Titanic Disaster. On Sunday, April 14, 1912, at 11:40 P.M. ship's time (10:45 P.M. New York time), the British steamship *Titanic*, of the White Star Line, struck an iceberg in lat. 41.46 N. and long. 50.14 W. (about 500 m. S. of Newfoundland and 1,600 m. E. of New York), and sank 2 hours and 40 minutes later, with a loss of about 1,500 lives. The *Titanic* was on her maiden trip across the Atlantic Ocean, and was in command of Capt. E. J. Smith. The number on board the *Titanic*, when she cleared the port of Southampton on April 10, was officially reported as 2,208. The number lost is estimated at 1,503. Of the 705 saved, the great majority

were women; while of the men who survived, more than half belonged to the crews that manned the lifeboats.

Titanium (Ti, 48.1), a metallic element of the tin group, occurring naturally as its oxide, TiO₂, as rutile, brookite, and anatase; in various titanates; and, with oxide of iron, in many titaniferous iron ores. Apart from its great use in steel making, titanium oxide has an interesting and unique field in giving artificial teeth a natural yellowness. It is used in arc lights; experimentally in incandescent filaments; in some newly invented chemical glassware; and as a mordant in the dyeing trades.

Titans, in ancient Greek mythology, were the children of Uranus and Gaea. They rebelled against their father, deposed him from the sovereignty of the gods, and made Cronus ruler of heaven; he married his sister Rhea. But his children, headed by Zeus, in their turn warred against him and the other Titans. The battleground was Thessaly, the Titans holding Mount Othrys, and Zeus and his fellows Olympus. At last Zeus won the victory by the aid of the Cyclopes, who armed him with thunder and lightning; and he cast the defeated Titans into the depths below Tartarus. The name Titan is also given to children of the Titans proper, such as Prometheus, Hecate, Latona, Helios, and Selene.

Titchener, Edward Bradford (1867-1927), Anglo-American psychologist, was extension lecturer at Oxford until 1892. In that year he became assistant professor of psychology at Cornell University, and in 1895 Sage professor of psychology. He was an associate editor of the *American Journal of Psychology*. His work, *Experimental Psychology*, marked him as a world-wide authority in that field.

Tithes were originally a payment of a tenth of such things as annually increase or render an annual crop—not minerals or timber. Tithes figure extensively in the Old Testament. The system was adopted by the Christian Church. Tithes were at first voluntary, but non-payment was later punished by excommunication. The law passed by Charlemagne, in the ninth century, was the first official recognition of the tithing system outside of the church. The system modified by the commutation of tithes into tithe rent charges has survived in Great Britain. Tithes (one-tenth of the income) are paid by the Mormons and by members of the Catholic Apostolic Church.

Titian (in Italian, *Tiziano Vecelli*, or

Vecellio (1477-1576), the greatest Venetian painter of the Renaissance, and as a colorist the greatest artist of his time. He was born at the castle of Cadore, near Friuli, in the Dolomite Alps. He studied under Gentile and Giovanni Bellini, when he had as fellow pupils Palma Vecchio and Giorgione. From 1513 to 1532, when he went to Bologna, Titian remained chiefly in Venice, painting such masterpieces as the *Assumption of the Virgin* for the Church of the Frari (now in the Venice Academy), *Christ and the Tribute Money* (Dresden), the *Holy Family* (Louvre), the *Frari Madonna* (Vatican), and the *Sacred and Profane Love* of the Borghese Gallery in Rome. The *Presentation of the Virgin* (Venice) dates from about 1539. In 1545 he went to Rome, where he met Michelangelo and painted the *Danaë* (Naples), a portrait of Pope Paul III., and the figure of Venus (in the Prado, at Madrid), listening to music. Religious works chiefly occupied his later years. Among these are the *Christ at Emmaus* (Louvre), *Magdalen* (Pitti Palace), *Saint Margaret* (Madrid), and the *Madonna, St. John and St. Catherine* (National Gallery, London). As the great colorist of the Renaissance, Titian stands alone. As a portrait painter he ranks with the first of any age. His figures live on the canvas, and his strong handling of light and shade, in contrast to the artificial and convention style of his predecessors, foreshadowed the powerful realism of Velasquez and Rembrandt. Consult Ruskin's *Modern Painters*.

Titlark, a common name for the meadow pipit. In North America the name is given to an allied bird (*Anthus pennsylvanicus*), which breeds in Canada and resorts to the United States in winter, when it is found feeding about open fields in small flocks.

Title, the union of all the elements constituting ownership vested in one person, is said to constitute a title to the property in question. This includes the fee, actual or constructive possession, and legal right of possession. The occupancy of property by a tenant only affects the immediate right of occupancy by the landlord, who is still seized of the fee. Title to one parcel of land may be vested in several persons, whose quantity of interest varies. This is often the case where land descends to heirs, who do not partition or sell it, and by reason of the death of one or more, their children or other heirs inherit their respective shares. Title may be acquired by descent or purchase, the latter term in law including all means of acquiring title other

than by descent. Title may be acquired by twenty years' adverse possession in most states, that is, a claim of and exercise of ownership as against all the world for that period.

Title, Covenants of, certain covenants usually inserted in conveyances of real property, containing assurances of a clear title to the grantee.

Title Deeds, the documents, such as mortgages, conveyances, and the like, which give the history of the ownership of land, and afford evidence of the holder's title.

Titles, distinguishing appellations belonging to persons of rank in right of birth or office, or assigned as a mark of respect.

Titto, Marshal (Josip Brozovich) (1890-), Yugoslav commander of guerrilla forces, was born in Zagorye; fought with the Bolsheviks (1917-24) in the Russian civil war; in 1924 headed the metal workers' union; in 1941 organized underground forces to free people from Nazis; had assistance of Allies. Became dictator 1945; elected pres. of Federal People's Repub. Jan., 1953.

Titration, the volumetric process of determining the quantity of a particular component in a solution by adding a measured quantity of a solution of a reagent of known strength to it from a graduated tube or burette, the completion of the reaction being shown by a suitable indicator.

Titular Bishops, certain bishops of the Roman Catholic Church who take their title from sees no longer existing. The expedient is useful in cases where an assistant bishop is needed, owing to the provision of canon law that there can be but one bishop to a diocese and no bishop without a diocese.

Titus, a devoted and trusted companion of St. Paul, of Gentile birth, who joined the apostle at Antioch, and went with him to Jerusalem. The Epistle to Titus found him at Crete, of which he is the traditional 'bishop.'

Titus, whose full name was **Titus Flavius Sabinus Vespasianus** (48-81 A.D.), Roman emperor, the son of the emperor Vespasian. He abolished trials for treason against himself, punished informers severely, and completed the Colosseum and the baths called by his name. His reign is rendered famous by the great eruption of Vesuvius, on Aug. 24, 79 A.D.

Titusville, city, Pennsylvania. It has been one of the most prominent places in the oil industry since the first oil well in the United States was drilled there in 1857. It suffered from severe oil fires in 1881 and in 1892; p. 3,126.

Tiumen, or **Tyumen**, town, Siberia, in the government of Tobolsk. It is the terminus of a railway line from Perm, and has manufactures of leather, carpets, soap, and pottery; p. 50,000.

Tiverton, market town, England. The church of St. Peter has an ancient tower and rich carvings. The chief industries are lace making, breweries and flower mills; p. 9,715.

Tivoli (anc. *Tibur*), ancient town, Italy. The sulphur baths of Acque Albule, as well as the picturesque falls, attract numerous visitors. In and around the town are many interesting antiquities, such as the 15th-century fortress built by Pope Pius III., the remains of Hadrian's villa, of Maecenas' villa, of the reputed temple of the Tiburtine Sibyl, and the Villa d'Este; p. 14,502.

Tlingit, or **Tlinkit**, the usual name for a group of Indian tribes residing on the Pacific coast in the southern extension of Alaska. In mode of life the Tlingit are seafaring folk. They make large canoes by hollowing out trunks of the large cedar trees found along the coast, some of which are sixty ft. or more in length and capable of carrying a hundred men. The Tlingit are considered among the most expert basket-makers in the world. From the root of the spruce they twine a fine, flexible basket, rich in color and decoration.

TNT, or **Trinitrotoluene**, $C_6H_2CH_3(NO_2)_3$, an explosive extensively used in warfare. It is produced in the form of pale yellow crystals, m.p. 81° C., prepared by acting upon toluene with a mixture of concentrated nitric and sulphuric acids.

Toad, in the strict sense of the name applicable to the members of the family Bufonidae, especially to the species of the type genus, but in combination applied to other amphibians not belonging to this family. The skin of the upper parts is much wrinkled and covered with the openings of numerous poison glands. The limbs are short, so that the animal is much less agile than its ally the frog; it has no teeth, and there are also certain peculiarities of the skeleton which differentiate the toads from the frogs. Toads are nocturnal in habit, emerging from their hiding-places at dusk in search of the live insects, worms, and snails which constitute their ordinary food. They are purely terrestrial in habits, and except at the pairing season do not voluntarily seek the neighborhood of water. The common toad of North America is *Bufo americanus*, ranging everywhere e. of the Rocky Mountains. In the Southern States another similar species (*B. lentiginosus*) is numerous,

and other species are known in the West.

Toadflax, plants belonging to the order Scrophulariaceæ, with flowers much like those of the snapdragon, but the base of whose corolla is spurred. The yellow toadflax (*Linaria vulgaris*) commonly known as Butter and Eggs, is a common roadside plant.

Toast, the name given to bread dried and browned before the fire. As early as the 16th century toasted bread formed a favorite addition to English drinks. The word is also applied to a person whose health is drunk at a banquet or other convivial entertainment as well as to the call to drink such health. The origin of the custom is explained in *The Tattler*, No. 24 (June 4, 1709), from which it appears that it was the usage of the time to drink with a piece of toast at the bottom of the glass.

Tobacco (*Nicotiana tabacum*), a plant belonging to the Solanaceæ, or nightshade family of which several poisonous plants as well as several vegetables, including the potato and the tomato, are also members. The plant grows from four to six ft. high and produces broad leaves, the size, form, thickness, and texture of which are largely controlled by plant and seed selection and by methods of cultivation. The blossoms are rose-purple in color, and are arranged in terminal panicles; the fruits are two- to four-valved; the seeds are minute. The word tobacco is derived from the Carib name of the inhaling apparatus 'tobaco.' The genus to which the plant belongs is named *Nicotiana* after Jean Nicot, a Frenchman, who introduced it into France. That the use of tobacco for smoking purposes is of some antiquity is shown by the discovery of pipes and other receptacles for tobacco in the prehistoric mounds of the United States, Peru, and Mexico. Its entry into England came between 1560 and 1565. Ralph Lane, Governor of Virginia, and Sir John Hawkins are credited with its introduction, although Sir Walter Raleigh and Sir Francis Drake were most influential in popularizing smoking.

The systematic cultivation of tobacco was begun in Virginia about 1612, shortly after the settlement of Jamestown, and became not only the staple crop, but the principal currency of the colony. In New England its cultivation did not develop to any extent until 1795, when the settlers in the Connecticut valley, finding soil and climatic conditions favorable, began to devote large areas to the crop. Tobacco may be cultivated in a great variety of soils and under different climatic

conditions, the type produced being influenced more than any other crop by the nature of the soil and climate. There are three methods of curing tobacco—(1) air-curing, in which little or no heat is applied; (2) flue-curing, carried out entirely by artificial heat but in such a way that no smoke comes in contact with the leaf; and (3) fire-curing, in which artificial heat is used and smoke is allowed to modify the flavor of the product. In the curing process most of the water in the leaf is lost, the total weight being diminished by about 75 per cent. Most cigar tobacco is air-cured, the tobacco being placed in sheds and the curing controlled by regulating the ventilation.



Tobacco Plant.

The primitive cigar was merely a few leaves of tobacco loosely rolled in the hand. Early in the nineteenth century cigar manufacture was undertaken in the Connecticut valley, and by the middle of the century, the industry was fairly established. There are two classes of cigars, hand-made and mould-made. On reaching the manufacturer the tobacco is first dampened to make it pliable, the stalk is stripped from the leaf, and the tobacco is graded into 'wrappers,' 'bunch wrappers,' or 'binder,' and 'fillers.' The fine perfect leaves make the outer 'wrapper,' the less

perfect, the 'bunch wrapper' or 'binder,' which is rolled around the 'filler,' and the smaller leaves and broken pieces, the inside or 'filler' of the cigar. The cigars are made at a table, on a hard wood board, on which the tobacco is cut to shape and rolled, the expert maker being able to form and roll it into whatever size and shape desired. Mould-made cigars are shaped and pressed in moulds. To prevent its unrolling the wrapper is gummed down with a tasteless colorless gum. The cigars are then sorted as to size, shape, and color, and packed in bundles or cedar-wood boxes for the market. The finest quality of tobacco for cigars comes from Cuba, near the city of Havana, and Havana cigars have a high reputation. Florida, the East Indies, and the Philippine Island tobaccos also rank high for cigars, and Turkish tobacco finds favor with some.

Cigarettes, like cigars, are of two classes, hand and machine made, the hand made being in greatest demand. The leaf is dampened, stripped of its stalk, and cut very fine by machine. The cut tobacco is lightly panned or stoved to remove excessive moisture and to bring out its aroma, then rolled in small pieces of parchment and transferred from these into prepared paper sheaths or 'spills,' to which cork or gold leaf tips are afterwards added by hand. Cigarettes are made mostly of light Virginia tobacco. The finest cigarette tobacco is grown in Macedonia, another fine cigarette leaf comes from Samsoun, and Thessaly; Greece and Servia also furnish good cigarette tobacco.

Pipe tobacco is made by passing the dried leaf through a cutting machine, stoving or panning it on hot metal plates, and then cooling it. It is then subjected to hydraulic pressure which forms it into hard slabs which are cut into bars and wrapped and again pressed. Plug and cake tobacco for chewing are made by moulding loose leaf in metal frames, using hydraulic pressure, wrapping with sound leaf and pressing again. It is sometimes sweetened or flavored with licorice, vanilla, or other substance. Snuff is tobacco powdered fine and scented. It was very fashionable in the early eighteenth century but today it is little used.

The United States leads the world in tobacco production, growing about 35 per cent. of the world's crop. The total production of this country in 1945 was estimated to be 2,042,000,000 pounds. The United States is also the greatest exporter, the greatest importer, and the greatest consumer of tobacco. The chief manufactured products are cheroots and

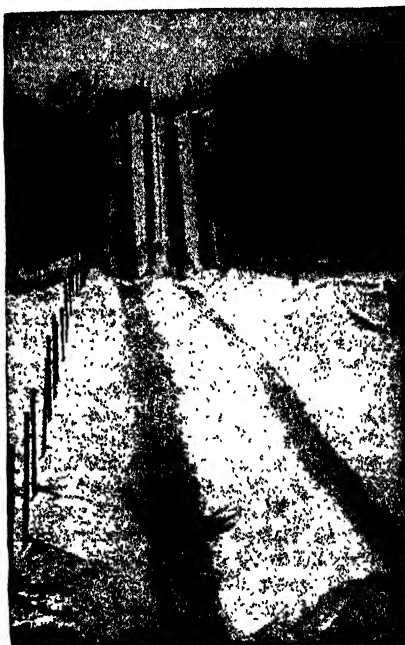
cigars, cigarettes, smoking tobacco (for pipes and cigarettes), snuff and chewing tobacco. Due to machinery development, the manufacture and consumption of cigarettes in the United States has doubled itself many times. The Federal government, many state governments, and some local communities levy taxes on tobacco products.

Tobago, one of the British West Indies, lying 22 m. n.e. of Trinidad. It has an area of 114 sq. m.; the surface is partly mountainous, and the coast is indented by several commodious bays affording excellent harborage. The cultivation of rubber has been introduced and coconuts and other fruits, rum, and molasses are exported. It is said to be the scene of Defoe's *Robinson Crusoe*; p. 20,000.

Tobit, **Book of**, one of the books of the Old Testament apocrypha, tells of Tobit, and Tobias his son. Tobit was a pious Israelite of the tribe of Naphtali, carried captive to Nineveh. Among his good works was the practice of defying the prohibition of the Assyrian kings by secretly burying the bodies of his slain fellow-countrymen. He was at last discovered, his goods were confiscated and to add to his misfortune he became blind. In his poverty he sends his son Tobias to Rhagæ (Rai) in Media to recover a debt from a friend. Tobias finds a companion in an unknown youth (really the archangel Raphael) and acting on the latter's advice, catches a great 'fish' in the Tigris, and secures its heart, liver, and gall. By means of the first two he is able to deliver from the power of the evil spirit Asmodeus his cousin Sara, daughter of Raguel, at Ecbatana, whom he marries and, after recovering the debt, leads back to his father's house. At home he is able with the gall of the fish to cure his father's blindness.

Tobogganing, a popular winter sport in the cooler climates. The word toboggan is taken from the Indian word *udâ bâ gân*, indicating a sled or drag, such as was used by the Indians to carry their game and goods over the snow. These sleds were fashioned of strips of birch bark, turned up at the end to allow them to slide easily over the snow, and bound together with thongs of leather. The modern toboggan is made on the same principle, the chief aim being to secure strength and lightness. It is constructed of narrow, well-seasoned, straight-grained, highly polished boards, fastened together by cross pieces. The front end of the sled is turned up and over to form a 'hood.' A toboggan is from 4 to 9 ft. long and about 18 inches wide; it accommodates from one to

five persons. In the Adirondack Mountain resorts tobogganing is very popular as well as in many places in Canada. Numerous country clubs near New York, Philadelphia, Boston, and other northern cities maintain toboggan chutes for the benefit of their members. In Switzerland, where tobogganing enjoys great popularity, there are many natural slides, such as the Klosters course at Davos and the Cresta run at St. Moritz.



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Tobogganing at Lake Placid.

Tobolsk, town, Siberia. Fishing and fur making are the chief industries; p. 18,268. The Czar Nicholas II. was imprisoned in this town after the Russian Revolution of 1917. Here took place severe fighting between the Bolsheviks and Admiral Koltchek's forces in 1919.

Toboso, small tn., La Mancha, Spain. It was immortalized by Cervantes as the home of Dulcinea in *Don Quixote*.

Tocantins, Rio, river of Brazil, rises in the southern part of the state of Goyaz, flows northward through Goyaz and Pará, and empties into the Atlantic through the estuary Rio Pará, which joins the estuary of the Amazon. The river is about 1,500 m. long,

and is navigable to a point 130 m. from its mouth.

Toccata, the title of one of the earliest forms of solo compositions for keyboard instruments. Its form is somewhat indefinite, but its music is always of a brilliant nature, and demands for its adequate performance great facility of execution and delicacy of touch.

Tocqueville, Alexis Charles Henri Clérel de (1805-59), French writer. In 1831 he visited the United States, having been sent by his government to study the penitentiary system. He published the report *Du système pénitentiaire aux Etats-Unis* (1832; Eng. trans.), an important work, crowned by the French Academy. While in the United States he also made a close study of its social and political institutions; and in 1835 published the first two volumes of his *Démocratie en Amérique*, a work which had an immediate and world-wide success, and secured his admission into the French Academy in 1841.

Todd, David (1855-1939), Am. astronomer, was born in Lake Ridge, N. Y. In 1881 he was made professor of astronomy and director of the observatory at Amherst. He was head of the Amherst eclipse expedition to Japan (1896), to Tripoli (1900), to the Dutch East Indies (1901), to Tripoli (1905), and South America (1925). He made the first attempt ever made to photograph a total eclipse of the sun from an aeroplane. He designed and erected numerous observatories including those at Smith College (1886-8), where he was professor of astronomy and mathematics (1882-7) and at Amherst College (1903-6). His publications include *New Astronomy* (1897), *Stars and Telescopes* (1899), *Astronomy Today* (1924).

Toddy, the name given in the East to the fermented sap of several varieties of palms. A rapid spontaneous fermentation gives the toddy, and this, when distilled, yields arrack. Whiskey and boiling water, with or without sugar and a slice of lemon, is also known as toddy.

Toga, the chief and distinctive garment of the ancient Romans, worn over the tunic. It consisted of a large piece of cloth, of a semicircular shape. It was put on with the straight edge hanging over the left shoulder and arm in front down to the feet; the part then hanging behind the back was brought round under the right arm and thrown over the left shoulder, with the end hanging down the back. The usual color was white, the material wool.

Togo, Count Heihachiro, Japanese admiral (1847-1934), was born in Kagoshima. In 1894, as commander of the cruiser *Naniwa*, he precipitated the Chino-Japanese War by firing on the Chinese transport *Kowshing*, and at the end of the war he was appointed vice-admiral, in command of the Maizuru admiralty. He was in command of the Japanese fleet during the Russo-Japanese war (1904-05).



Roman Toga.

Togoland, a strip of country, in Upper Guinea, West Africa, from 1884 to 1914 a German protectorate. It covers an area of 33,659 sq. m. The country is capable of growing almost all tropical products. Maize, yams, and coffee are raised.

Tojo Hideki (1885-), Japanese army officer and statesman, was born in Iwate Prefecture; educated at Imperial Military Academy, Tokyo; vice war minister (1938); chief of air force (1939); war minister (1940-41); premier (1941-44). In 1945, when held as a war criminal, he unsuccessfully attempted suicide.

Tokay, or **Tokaj**, town, Hungary. It is a small town situated at the foot of the Hegyalja Mountains, whose slopes produce the famous Tokay wines; p. 5,300.

Tokio. See **Tokyo**.

Tokugawa, a powerful Japanese family whose members reigned as Shoguns from 1603 to 1868. Iyeyasu, the first Shogun, a descendant of the Minamoto family, made Yedo his capital and founded a dynasty which lasted for 265 years until Keiki, the fifteenth Shogun, surrendered his authority to the Emperor in 1868. With his retirement the political power of the family passed away.

Tokyo (Tokio) formerly **Yedo** or **Jedo**, the capital and largest, and wealthiest city of Japan. The Mikado's palace occupies

a central position on the site of the former Shogun's castle. Around the palace, on the higher grounds, are the Parliament buildings, the official quarter, and the European buildings, constructed on the sites of the mansions of the former daimios and their retainers. On the high ground to the n. stand the Imperial University, and the Russian cathedral. Institutions for higher education include the Imperial University of Tokyo, Waseda University (1902), Nippon Woman's College (1901), and the Catholic University (1908). The commercial city stands on lower ground, reclaimed from sea and marshes, and is intersected by many canals, crossed by numerous bridges. Tokyo is the railroad center of the island; p. 7,000,000. Tokyo's importance dates from 1590, when it fell into the hands of Iyeyasu, who in 1603 became Shogun and made it his capital. Tokyo means 'Eastern Capital,' and received that name in 1868, when the Mikado took up his residence there. In 1872 and in 1911 a large part of the city was destroyed by fire; in 1923, an earthquake shock, fol. by a tidal wave and fire, almost destroyed Tokyo. Apr. 1942, the U. S. Army Air Force conducted a sensational raid on the city. In 3 months, beginning Feb. 1945, there were 6 bombing attacks, which laid waste 51 sq.m. of the city. In Sept. Gen. MacArthur entered Tokyo and began the Am. occupation, which ended Apr. 1952 with signing of U. S.-Jap. mutual security pact.

Tokyo, Imperial University of, the largest university in Japan, founded in 1887, is supported by the state. It is governed by a president and a board of councillors.

Toledo, city, Ohio; p. 282,349. The city has a manual training school, a city normal school, a municipal university, St. John's College, and a medical college, a law library and museum of art. In 1933, the Toledo Museum of Art opened two new wings, one housing a concert hall and the other the museum school. Toledo's location and the facilities for transportation by rail and water combine to make it a commercial center of importance. It is one of the most important primary grain markets in the United States. It is also a shipping center for soft coal and an important market for lumber. Manufactures include automobiles, automobile parts and accessories, foundry and machine-shop products, petroleum products, oil-well supplies.

Toledo, city, capital of Toledo, province, Spain, is a romantic Moorish walled city, on an imposing eminence over the Tagus. The superb Gothic cathedral contains priceless

works of art, including paintings by El Greco, Titian, and Rubens. Toledo's Moorish and Mudejar remains are of considerable interest, particularly the Alcazar. Its swords were once famous, and a large trade in steel cutlery is still carried on, as well as cloth-weaving and inlaid gold work on steel and iron; p. 25,683. Toledo was the capital of Gothic Spain and of an independent kingdom under the Moors. It was captured by Alfonso vi. and made the Christian capital in 1085.

Tolstoy, or Tolstoi, Count Lyoff Nikolaievitch (1828-1910), Russian novelist, was born at Yasnaya Poliana in the government of Tula. In 1863 he began what was to prove one of the greatest of his works, *War and Peace*. This novel, which deals with the conditions of Russian society in the momentous period of 1805 to 1815, won for its author a high place in the world of letters as a novelist of intensely realistic method. About 1873 he began *Anna Karenina*, his second greatest work, and one which, like *War and Peace*, while ostensibly dealing with the conditions of society, represents in an unmistakable manner the writer's own mental experience. But he was not content to devote his life to novel writing. *The Kreutzer Sonata* (1889) deals with the sordidness of social conditions, and is typical of the morbid subjectivity that runs through all his writings. In 1895 Tolstoy's socialistic tendencies found practical expression when he voluntarily renounced his property in copyright, land, and money. Having divested himself of his estate, which he was prevailed upon to make over in favor of his wife, he thereafter continued to live the life of an ordinary peasant on the land. In order to escape to the solitude that he desired, he disappeared from his home in 1910, but was discovered in a hut at Astapova, stricken with heart disease, of which he died soon afterward (Nov. 20). Among Tolstoy's other works may be mentioned *Resurrection*; *The Kingdom of God is Within You*; *Master and Man*; *Ivan Ilyitch*; *What is Religion?* *The End of the Age*. See Gorky, *Reminiscences* (1946).

Toltecs, a prehistoric people of Mexico and Central America, to whom the Aztecs and the Mayas ascribed all their arts, and all ancient monuments the origin of which was unknown.

Toluca, town, Mexican capital of the state of Mexico. It is located at an elevation of 8,650 ft. in the basin of the plateau, at the base of the snow-crowned volcano Nevadade Toluca (14,950 ft.), from which both the

Atlantic and Pacific Oceans are said to be visible; p. 1954, 115,444.

Tomahawk, the war club of the North American Indians, with a head of stone, attached by thongs.

Tomato, a popular garden and market vegetable, is the fruit of *Lycopersicum esculentum*. The flowers are yellow; the fruit is a shade of red or yellow, and of various shapes. The tomato is extensively grown in the United States as a field crop for canneries, and in the North is one of the prominent winter forcing crops. Tomatoes are sensitive to frost, but otherwise are of easy culture.

Tom Thumb. See **Stratton**, **Charles Sherwood**.

Ton, a measure of weight and capacity. In the United States a ton is usually 2,000 lbs. (called a short ton), the cwt. when used being reckoned at 100 lbs., although in some states the ton of 2,240 lbs. (called the long ton) is usual with coal at wholesale and other commodities.

Tonawanda, town, N. Y. The region in which it is located, between Buffalo and Niagara Falls, was famous during the French and Indian War. It has a large wholesale trade in lumber; p. 14,617. Tonawanda was



Toledo: Art Museum.

Tomb, a term meaning either the grave in which the body of the dead is buried, or the monument raised to his memory above the grave. In Assyria, and Egypt, as in other parts of the East, pyramidal tombs were long in vogue. Tombs cut out of solid rock, forming groups of catacombs, were copied from the Egyptians by the Hebrews as well as by the Romans. Roman tombs were commonly circular or tower-like structures, which may be found in large numbers outside the gates of Rome and of Pompeii, in France, and in Asia Minor. In the Middle Ages the circular type with a dome was much used by the Moslems, and may be seen in the very numerous tomb mosques outside of Cairo, and in single structures such as the Taj Mahal in Agra. European tombs of this period were commonly sarcophagi in the churches, standing alone or against the walls, decorated and usually overhung with canopies.

Tomlinson, Henry Major (1873-), English journalist and author, was literary editor of *Nation* and *Athenaeum* (1917-23). His works include *Gallions Reach*, *South to Cadix*, *Snows of Helicon*; *Turn of the Tide*.

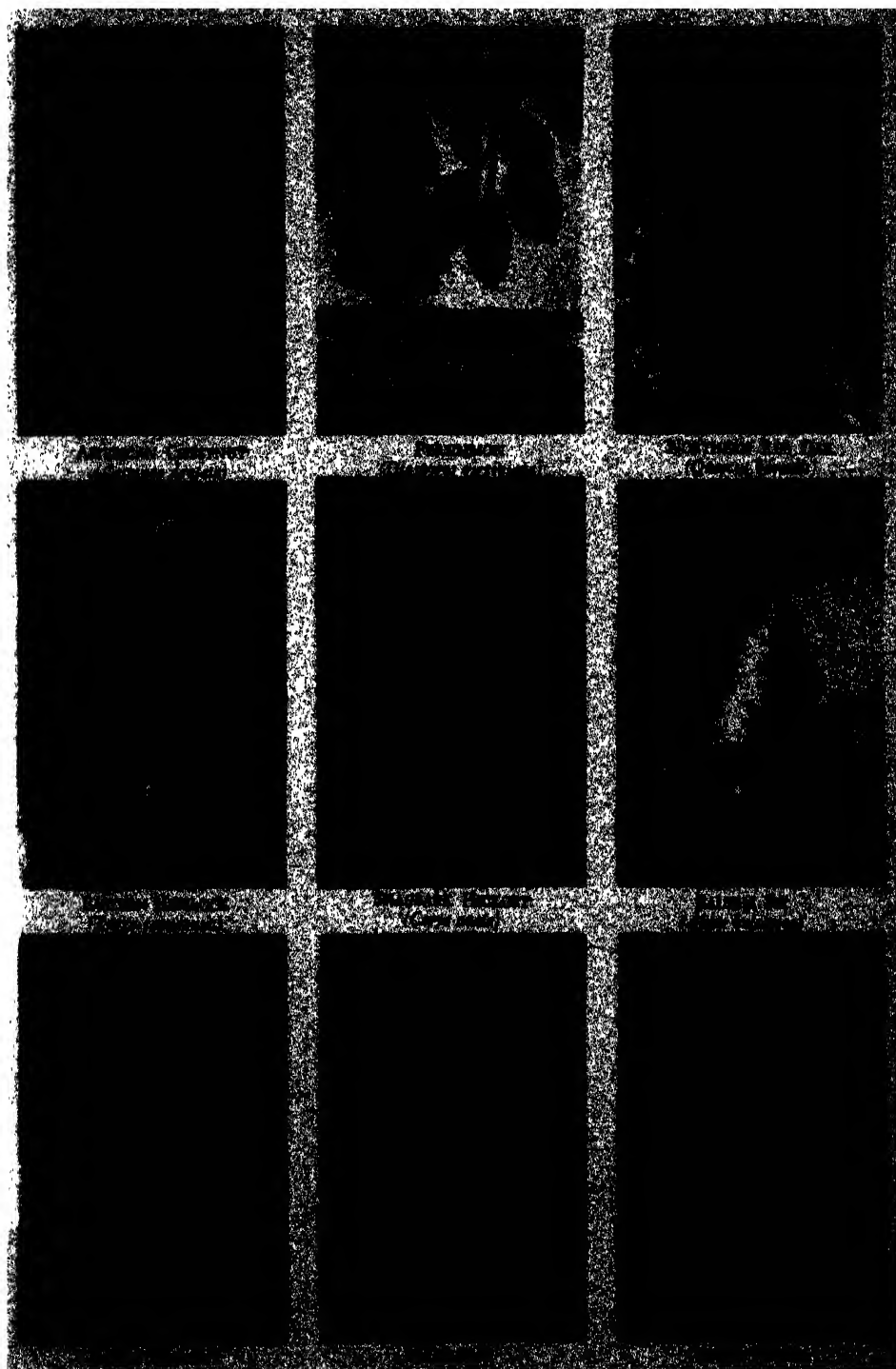
first settled about 1820, and became a city in 1904.

Tone, in music, is the interval of a major second. When prefixed by such words as 'full,' 'rich,' 'high,' etc., it indicates the quality or comparative degree of pitch of a musical sound.

Tonga, or Friendly, Islands, lie s.e. of the Fiji Is. between 15° and 23° 30' s. and 173° and 177° w. They constitute a British protectorate. Area, 390 sq. m. Mostly of coral formation, they are very rich in cocoanuts, copra being the principal export; p. 29,439.

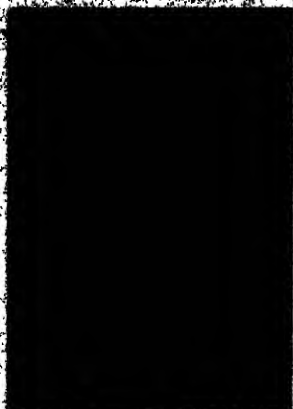
Tonkin, a French dependency of Indo-China, area, 46,400 sq. m. The ruling factor on Tonkin is the Song-Koi, or Red River, flowing from n.w. to s.e. On the coast is a coal basin. The lands of the delta, one vast rice field, yield generally two crops a year. On Jan. 1, 1902, Hanoi, capital of Tonkin, superseded Saigon as capital of French Indo-China; p. 8,012,429. (Formerly Tong-king.)

Tongue, the special organ of taste, is also an important factor in the process of mastication and in the production of speech. My-

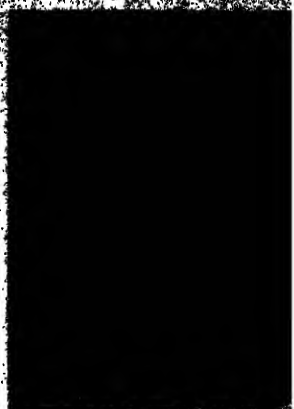




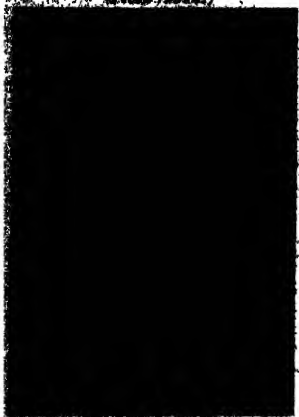
RED SPRUCE
(*Picea rubens*)



REDWOOD
(*Sequoia sempervirens*)



QUAKING ASPEN
(*Populus tremuloides*)



AMERICAN BEECH
(*Fagus grandifolia*)



COCO PALM
(*Cocos nucifera*)

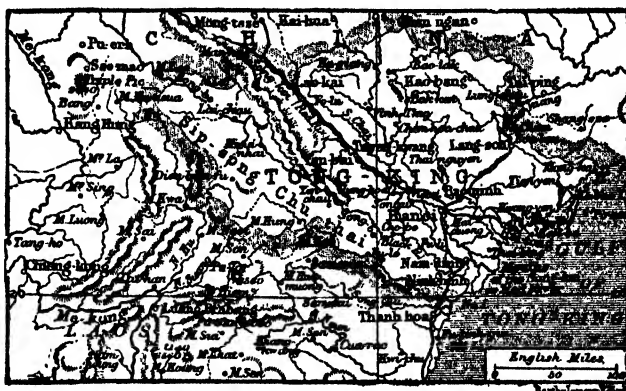


GIANT SEQUOIA
(*Sequoiadendron giganteum*)



cous membrane invests its entire free surface; it is composed of elements analogous to those of the skin—a cutis or corium, which supports numerous papillae, and is covered by squamous epithelium. The roughness of the tongue surface is due to the papillae in which the nerves of taste terminate, forming a plexiform network, with brush-like branches and filaments which pass to peculiar end-organs known as 'taste goblets.'

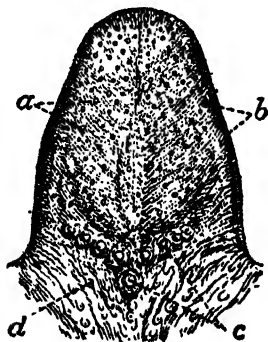
Tonnage. The tonnage of a ship is the weight or carrying capacity expressed in tons. Tonnage is of four kinds—*displacement tonnage*, *gross tonnage*, *net tonnage*, and *dead-weight tonnage*. The displacement tonnage is the weight of the ship and contents when loaded to a definite draught. Gross tonnage is obtained by ascertaining the total internal capacity of the ship (in cubic feet) below the upper deck and of all enclosed spaces or deck-



Tong-king.

Tonic, the fundamental keynote of a scale. See Music.

Tonics, therapeutic agents which increase the vigor of the bodily organs generally, or of one system or organ, and which produce a



Tongue.

A, Fungiform papillae; B, filiform papillae; C, circumvallate papillae; D, glands.

more prolonged and permanent effect than mere stimulants. Among the more common general tonics are iron, nux vomica, quinine, vegetable bitters, cold baths, and exercise.

houses above it, and dividing the result by 100. The net tonnage is obtained from the gross tonnage by subtracting from the measurement (before dividing by 100) the cubic contents of all spaces not devoted to the carrying of passengers or cargo. Dead-weight tonnage, or dead-weight carrying capacity, is the weight of lading of a ship at deep-load draught.

Tonnage Duties, taxes levied on ships at a given amount per ton.

Tönsberg, the oldest tn. in Norway (founded in 871). To Tönsberg belongs the greater portion of the Norwegian Arctic whaling fleet; p. 12,674.

Tonsils, two large rounded glandular bodies, lying at the back of the mouth, between the 'pillars of the fauces.' When inflamed they may meet across the middle line. The tonsils are apt to become implicated in any inflammatory condition of the throat, and a certain amount of acute tonsillitis (inflammation) may occur with any of the fevers. Acute peritonsillitis, or quinsy, often occurs alone.

Tonsure, the cutting of the hair which signifies dedication to a clerical or monastic life. The first mention of clerical tonsure is in the 5th century.

Tontine. A system of investment, the chief feature of which is the contribution of capital by a number of persons, under an agreement that the whole amount, or the income therefrom, shall be paid to the last survivor, or to all those who survive a certain period. The idea was first advanced by one Lorenzo Tonti, an Italian banker, and found favor later at the French court as a means of raising a public loan. It has been extensively applied to life insurance.

Toombs, Robert (1810-85), American executive and soldier, was born in Wilkes co., Ga. He served in 1836 against the Creeks in Alabama; in 1837-40 and 1842-3 was a member of the Georgia legislature, and in 1845-53 a Representative in Congress. In 1853 he was elected to the U. S. Senate. After the election of Lincoln, Toombs advocated secession and resigned from the Senate. He was a member of the Confederate Provisional Congress that met in Montgomery (Feb. 4, 1861), and was the favorite of a minority for the presidency. On Feb. 21 he became Confederate secretary of state. After the war Toombs went abroad to escape arrest, and visited Cuba, France, and England. Returning in 1867, he amassed a fortune by his legal practice. His hatred of reconstruction measures was so great that he would never apply for amnesty and was never restored to citizenship.

Toothwort, the common name given to a genus of parasitic plants belonging to the order Orobanchaceae. They have a bell-shaped calyx and a two-lipped corolla. The name Toothwort is applied also to the Pepper Root (*Dentaria diphylla* and *laciniata*), a perennial herb growing in moist rich soil from Maine to Minnesota and southward. It bears a terminal corymb or short raceme of large white, pink, or purple flowers.

Top, a familiar toy, usually pear-shaped, of wood or metal, which is made to revolve on a metal point by the rapid unwinding of cord with which it is wrapped, or by the strokes of a whip. The top was known to the ancient Greeks and Romans, and is said to have been in common use in England as early as the 14th century.

Topaz, an aluminum silicate and fluoride, AlF_2SiO_4 , containing up to 20 per cent. of fluorine. It has a hardness of 8, a specific gravity of 3.55, and a very good basal cleavage. Its crystals are orthorhombic; its lustre is vitreous or somewhat pearly on the basal plane; and as a rule the mineral is fresh and

unweathered. The color is usually honey yellow, but may be amber, wine, pale bluish and greenish of many shades, grayish, pink, or white. When of a fine color, and transparent, the stones are used as gems. Some of the brownish Brazilian topazes, when heated, become pink, resembling the Balas ruby, and in this state are a good deal used for the cheaper kinds of jewelry. Topaz is usually found in metamorphic rocks, but frequently accompanies tin stone, beryl, tourmaline, and white mica.

Tope, a structure or cairn erected by Buddhist monks for the preservation of sacred relics. They abound, usually in groups, in Central India, in Kashmir and in the Indus valley, and in Ceylon, where they are called 'dagobas.'

Tope, a small shark, usually about 6 feet in length, belonging to the family Carchariidae, widely distributed over tropical and temperate seas. In France and Italy the tope is sometimes eaten either fresh or after drying; the liver is also used for oil. The tope is not common in American waters, but the name is sometimes applied to a dogfish.

Topeka, city, capital of Kansas, county seat of Shawnee co. Notable buildings and institutions are the State Capitol, Federal Building, City Hall, Grace Church Cathedral, and Bethany College. Topeka has coal-mining and stone-quarrying interests. Topeka was settled in 1854 by people from the Northern States and became the State capital in 1861; p. 78,791.

Topelius, Zakarias (1818-98), Swedish author, was born in Kuddnäs, Finland. After Runeberg, he is the most prominent and popular of the Swedo-Finnish authors. His best lyrics are contained in *Ljungblommor* (1845-54), *Sanger* (1861), and *Nya Blad* (1870), all marked by tender religious feeling, exquisitely expressed. He wrote also dramas of considerable merit, but is best known by his cycle of historical romances, especially the famous *Fältskärens Berättelser* is an English translation. His books for children, *Läsning för Barn* (1865-91) are also perfect of their kind.

Toplady, Augustus Montague (1740-78), English hymn writer, was born in Farnham, Surrey. He is best known as the author of the hymn, *Rock of Ages*.

Topography, the description, pictorial or textual, of a limited area, on a given scale. Topographical maps treat of natural features (drainage and relief) and cultural features

(cities, roads, bridges) in as complete detail as the scale permits.

Torah. Primarily it signifies an authoritative direction, given by the priests in the name of God, on all questions of moral, ceremonial, or religious duty. Specifically it is applied to the Pentateuch, as containing the law of God given through Moses.

Torbanite (Boghead Coal or Torbane Hill Mineral), a dark brown, lustreless, oil-bearing shale worked on Torbane Hill, Scotland. It is used for the extraction of lubricating and burning oils, illuminating gas, and paraffin.

Torgau, fortified town in Saxony. The castle (Schloss Hartenfels), one of the largest Renaissance buildings in Germany, contains a chapel consecrated by Luther. There are manufactures of gloves, glass, and pottery; p. 12,612.

Tornado, a violent and destructive local storm, attended by a funnel-shaped, pendant cloud, around which the winds revolve in a direction opposite to that of the hands of a watch. It generally occurs in the southeast quadrant of an area of low pressure, and travels from southwest to northeast, moving along a path seldom more than a few hundred yards wide, and averaging some 20 or 30 miles in length. Tornadoes are most frequent in the lower Missouri Valley during the summer months.

Toronto, capital and chief city of Ontario, Canada, second city of the Dominion in population and importance, is situated on the northwest shore of Lake Ontario. The fine harbor gives it an artistic setting throughout its ten miles of lake front. Exhibition Park contains the exhibition buildings in which the Canadian National Exhibition is held annually. Notable buildings include the Lieutenant-Governor's official residence; the provincial Parliament and Departmental buildings in Queen's Park; the Romanesque City Hall and Court House. The name Toronto ('the place of meeting'), given to the site of the city by Indians, hints at the natural advantages which have led to its commercial development. It is now one of the chief distributing centers for Ontario, Manitoba, Alberta, Saskatchewan, and British Columbia, and has also a wholesale trade with the maritime provinces. Toronto's largest industry is the manufacture of clothing, including hats, gloves, and furs. The metal industry is the next in importance and includes the manufacture of engines, boilers, mach-

inery, implements, tools, and metal goods of all sorts. The chemical industry, printing and allied trades, book publishing, and the manufacture of stationery and paper goods are of increasing importance; p. 675,754.

Torpedo, or Electric Ray, a genus of elasmobranch fishes, remarkable for the presence of a well-developed electric organ, capable of giving a powerful shock. There are about fifteen species, the most common of which, *T. marmorata*, occurs in the Mediterranean.

Torpedo. A torpedo consists of a case filled with a powerful explosive which may be fired by an observer or by contact with the hull of a vessel. The earliest use of torpedoes was apparently that made by Gianibelli, who in 1585 destroyed a bridge across the Scheldt by means of small explosive vessels. Aside from the boats of Gianibelli, the first torpedoes used in war were designed and built by David Bushnell, in 1776. The next important experimenter was Robert Fulton, but it was not until the Civil War that the torpedo became an important weapon. Torpedoes are of two principal types, *fixed* and *mobile*. Fixed torpedoes are now commonly known as mines. Mobile Torpedoes are of two principal types, *controlled* and *uncontrolled*. CONTROLLED TORPEDOES are classed as Spar, Towing, and Dirigible. Spar torpedoes derived their name from the spar or boom to which they were attached. In the Civil War it was repeatedly employed by both sides; Cushing achieving undying fame by the destruction of the Confederate ram *Albatross*, while the crew of the *David* went heroically to death in destroying the U. S. S. *Housatonic*.

UNCONTROLLED TORPEDOES are Drifting, Projectile, Automobile. Automobile torpedoes include the rocket and fish types. The automobile fish torpedo is the only one of the automobile class now in service, and the designation 'fish' has been dropped. It has superseded all other kinds because of its greater speed, accuracy, range and general efficiency. The first successful torpedo of this type was completed in 1866 by Robert Whitehead, an Englishman who was manager of an engine factory at Fiume, Austria. The hull was really fish shaped, but soon took on the shape of a cigar, pointed at both ends, and cylindrical for nearly half the length. The improvement in speed, accuracy, and range has been practically continuous.

At the present time, Whitehead or similar torpedoes are in extensive use in all navies—

on large vessels, surface torpedo craft, and submarines. The development of the submarine has brought out a type of torpedo with high speed (50 knots) and large explosive charge (400 to 450 pounds). The Schwartzkopf torpedo is practically the same as the Whitehead, of which it is the German modification. The next most important torpedo is the Bliss-Leavitt, which is made in Brooklyn.

Torpedo Boat, a small vessel having the highest attainable speed consistent with handiness and general efficiency, primarily intended for discharging torpedoes against a hostile ship. See SUBMARINE.

Torquay, seaside resort, Devonshire, England, picturesquely situated on Tor and Babbacombe Bays. Some remains exist of Tor Abbey, and about a mile from the center of the town is Kent's Hole, a noted bone cavern; p. 46, 165.

Torque (Latin, *torqueo*, 'I twist'), a species of gold ornament, worn round the neck or arm, which was much in use in ancient times. Numerous examples have been dug up in Great Britain and Ireland, as well as in France.

Torre del Greco, seaport and seaside resort, Italy, at the southwestern base of Mount Vesuvius. Eruptions have destroyed it many times; the chief industry is fishing; p. 35, 500.

Torrens System, a method of judicial registration of titles to land whereby in a legal way a land owner may avoid the necessity of expensive re-examinations when the property is subsequently transferred, mortgaged, or otherwise dealt with, and may utilize it as a much quicker and more liquid asset. The system was devised by Sir Robert R. Torrens, premier of South Australia, in 1857. It met with prompt acceptance throughout Australia; was extended to other dependencies of Great Britain; and was later adopted by many States of the United States. Modifications of the system are also in use in Norway, Denmark, Sweden, France, Germany, Austria, Switzerland, and other European countries.

Torrón, town, Mexico. In March, 1914, a fierce and sanguinary battle was fought here between the troops of President Huerta, commanded by General Valesco, and the forces of General Villa. The latter was successful, and the cause of Huerta was dealt a fatal blow; p. 65, 000.

Torres Strait, between New Guinea and York Peninsula, Queensland, Australia, is from 80 to 90 m. broad. Navigation is rendered

difficult by reefs, shoals, and islands. The strait was first navigated in 1606 by the Spaniard Torres; its present name dates from 1762.

Torrey, Charles Cutler (1863-), American educator and Orientalist, was born in East Hardwick, Vt. In 1901, on leave of absence from Yale, he acted as director of the American School of Archaeology in Jerusalem. Since 1900 he has been co-editor of *The Journal of the American Oriental Society*. His publications include: *The Mohammedan Conquest of Egypt and North Africa* (1901); *Exra Studies* (1910); *The Second Isaiah* (1928); *The Four Gospels, a New Translation* (1933).

Torricelli, Evangelista (1608-47), Italian mathematician and philosopher, was born in Piancaldoli in the Romagna. On Galileo's death he was appointed mathematician to the grand duke, and professor to the Florentine Academy (1641). He discovered the principle upon which the barometer is based (see BAROMETER). To him we owe, also, the fundamental principles of hydro-mechanics, and important improvements in both telescopes and microscopes. His chief work is *Opera Geometrica* (1644).

Torsion, in mechanics, the state of strain in an elastic material subjected to a simple twist. The ratio of the supporting stress to the strain is called the rigidity of the material. The moment of force required to sustain the condition of twist in a given rod is called a *torque*; and when the twist is unity, the torque is the measure of the torsional rigidity of that particular specimen. It can easily be shown that the torsional rigidity of a cylindrical wire or bar of a given material increases as the fourth power of the diameter.

In the so-called *torsion balance* the torsional rigidity of a wire is used for the measurement of various kinds of forces. The most important practical application of the torsional rigidity of a wire is in the ordinary spring balance. *Torsion*, in surgery, is a method of checking arterial hemorrhage in certain cases.

Torso (Italian) strictly signifies a trunk—e.g., the trunk of a tree—but is especially applied to a statue of which only the body remains. The most famous example is the *Torso Belvedere*, unearthed in the 15th century, and preserved in the Vatican Palace at Rome.

Tort (from Latin *torqueo*, 'to twist'), a term of Anglo-American law denoting all civil injuries which are not merely breaches of contract. It consists in a violation of the

fundamental or primary rights of a human being, such as his right to life, to property, to personal freedom, to good reputation, etc. The same wrongful act may, however, sometimes be regarded either as a tort or as a breach of contract. Torts are accordingly sometimes classified according as they are or are not independent of contract. The remedy for a tort is an action of damages against the 'tortfeasor.' But the same act may be both a tort carrying with it this means of reparation and also a crime rendering the guilty party liable to punishment. Injuries which are purely criminal do not fall under the category of torts.

Tortoises and Turtles (*Chelonia*) form a well-defined order of reptiles, distinguished especially by the dorsal and ventral shields which protect the body. Although terrestrial Chelonians are often called tortoises, and aquatic Chelonians turtles, the distinction cannot be sustained. The dorsal shield or carapace, within shelter of which the head, limbs, and tail can be more or less completely sheltered, is formed (a) along the middle line by the vertebræ whose neural spines are flattened, (b) by expansions of the parts which in other animals form well-defined ribs, and (c) along the edge by marginal plates ossified in the under skin or dermis. The dorsal vertebræ and ribs are thus rigidly involved in the carapace; the neck and the tail are the only flexible parts. The ventral shield or plastron consists of nine bony pieces, one anterior and four on each side. They arise as membrane bones in the dermis. Overlapping, but not corresponding to the bones of the shields, are horny epidermic plates of *tortoise shell*, which although hard are not without sensitiveness, numerous nerves ending upon them. There is no breastbone, and, according to most authorities, there are no clavicles. The heart, as in other reptiles except crocodiles, is anatomically three-chambered.

Tortoises can live for a long time without food; they are very difficult to kill. All Chelonians are oviparous. The eggs have a firm shell, which is in most cases rigidly calcareous. They are usually laid in the sand or mud, and left to be hatched by the warmth of the sun.

Tortoise Shell is composed of the horny shields which cover the carapace of the hawk's-bill turtle. A large specimen may yield as much as eight pounds of shell. Each scale is beautifully marked, but is very thin, and for purposes of manufacture it is necessary to weld several together. The manu-

facture of genuine tortoise-shell ornaments is carried on chiefly in the East, the finest tortoise shell being exported from Celebes to China.

Tortoise Shell Butterfly, a name applied to several butterflies with black or brown wings marked with red, yellow or orange. The Camberwell Beauty or Mourning Cloak (*Euvanessa antiopa*) is in this class, as are species of *Aglais* and *Eugonia*.

Tortola, the most important of the British Virgin Islands in the West Indies, lying n.e. of the island of St. John. Sugar and cotton are cultivated, and these with molasses and rum are exported. Capital, Roadtown. Area, 24 sq. m.

Tortona (ancient *Dertona*), town, Piedmont, North Italy; 12 m. s.e. of Alessandria. It has a cathedral dating from the ninth century and a ruined castle. Silk is manufactured; p. 20,000.

Tortosa, city, Northeast Spain, in Catalonia, near the mouth of Ebro; 43 m. s.w. of Tarragona. It is very picturesque, and has a long history of wars from the time of the Moors; it has also a magnificent Gothic cathedral (14th century). There are manufactures of paper, hats, leather, majolica, and soap; p. 35,491.

Torture, in a legal sense, means the application of bodily pain in order to force evidence from witnesses, or confessions from



Toco Toucan

persons accused of crimes. It was applied to slaves at Athens, and the Athenian and Rhodian laws allowed it to be applied even to citizens and freemen. The use of torture had become fully established in the time of the early emperors. The first trace of any ecclesiastical sanction of this mode of proceeding, even in the case of heresy or apostasy, is found in a decree of Innocent IV. in 1282. Judicial torture formed a part of all the legal

systems of Europe which adopted the Roman law, but the horrors of the Inquisition and the excessive use of judicial torture gradually brought about a change in public sentiment and led to the abolishment of the practice. Among instruments of torture were the 'iron maiden of Nuremberg,' the rack (introduced into England by the Duke of Exeter—thence called 'the Duke of Exeter's daughter'), thumb-screws, pincers, and manacles.

Tory, in English politics, a term like the corresponding term 'Whig,' originally applied in derision and contempt. The term Tory, as the political counterpart of Whig, was used from the Revolution to the time of the Reform Bill of 1832, when it began to be superseded by Conservative. In America Tory was applied to the loyalists at the time of the Revolutionary War. See LOYALISTS.

Toscanini, Arturo (1867-), Italian orchestral conductor. He conducted successively in Turin, Treviso, Bologna, Genoa and Milan. He went to New York in 1908, where, until 1915, he served as chief conductor at the Metropolitan Opera House. He returned to Italy in 1915. In 1921 he returned as conductor at La Scala, Milan, and was guest-conductor of Philharmonic Orchestra, New York City from 1926.

In the summers of 1935 and 1936 Toscanini conducted the Vienna Philharmonic Orchestra at the annual Music Festival in Salzburg, Bavaria. In 1936, was the first recording of his music, a Wagner Album by Victor.

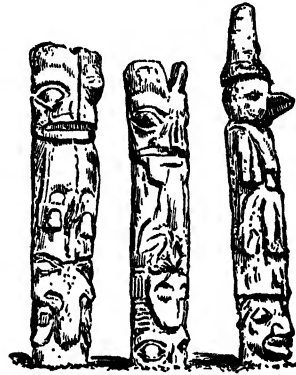
In 1937, he conducted a Jewish orchestra at Tel Aviv, Palestine, and then returned to America to form a symphony orchestra and broadcast concerts for N.B.C.

Tosti, Francesco Paolo (1847-1916), Italian musical composer who in 1880 became teacher of singing to the English royal family. Among his popular songs are *Come to my Heart, Goodbye, That Day, Mother, For Ever and for Ever*.

Totalitarianism, a system of government marked by the "total" control of the individual and society by the state. See GERMAN; ITALY; HITLER; MUSSOLINI.

Totemism, the name given to the system of tribal subdivision denoted by totems, which are natural objects, usually animals, assumed as the emblem of a clan or family. Often the totem is regarded as the ancestor of the tribe and is closely associated with its deity. Totemism has often existed as a stage of development among many highly civilized nations of antiquity and it now occurs among tribes in a low stage of development and through wide-

spread, it is by no means universal. It is found most fully developed among the American Indians and the aboriginal tribes of Australia. Totemism has a ritual affecting the crises of life. At birth a totem mark is

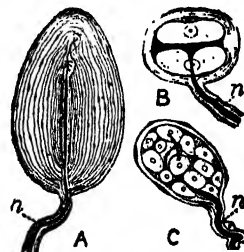


Totem Poles from Indian Graves at Klinkwan

tattooed or painted on the infant, at marriage certain rites are observed, and at death the member may be laid in a grave made in the form of the totem.

Tottenham, town, England, in Middlesex, on the River Lea; 6 m. n.e. of London.

Toucans (Rhamphastidae), a family of South American birds, which, because of the shape of the bill, were formerly believed to have some relation to the hornbills; their nearest allies are, however, the honey-guides and barbets. The bill is enormously large, but is without the helmet seen in the hornbills. The plumage is long and loose, and, like the huge bill, is brilliantly colored.



Touch—Nerve-endings

A. Pacinian corpuscle. B. Touch corpuscle from duck's tongue. C. End-bulb from human conjunctiva. n. Entering nerve-fibres.

Touch, one of the five special senses. The physiological basis of touch sensation is a

highly complicated nerve-ending or tactile end-organ. These are distributed over the whole area of the skin, more densely in some places than in others. Subjectively, tactile sensation varies in different parts. Touch sensations may be passive, as in sensations of pressure; or active, as in sensations of resistance or weighing—these sensations involving movement. Surfaces are discriminated by touch as hard or soft, rough or smooth. Touch with movement is the basis of our experience of extension, which includes form, and therefore solidity, which is form with resistance.

Touchstone, a device for roughly ascertaining the purity of gold alloys. It consists of a smooth strip of hard black stone, on which a corner of the alloy is rubbed so as to leave a streak, which is then moistened with an acid composed of 78.4 per cent. nitric acid, 1.6 per cent. hydrochloric acid, and 20 per cent. of water. By comparing the effect with that produced on streaks made with alloys of known composition, an approximation to the gold content of the alloy is found.

Touchwood, a soft, whitish substance produced in wood by the action of certain fungi, especially of *Polyporus ignarius*. It burns like tinder if a spark is dropped on it; hence its popular name.

Toulon, seaport town, France, in the department of Var, on the Mediterranean; 42 m. s.e. of Marseilles. It has an excellently sheltered double harbor, was early a place of maritime trade, and is now France's chief naval port and arsenal on the Mediterranean. Toulon was the Greek *Telonion* and the Roman *Telo Martius*, famous for its dye-works. In the 17th century its arsenal and dockyards were begun by Vauban. Both were destroyed by the British in 1793; p. 115,120.

Toulouse, town, France, capital of the department of Haute-Garonne, lying in the middle of the great plain of Gascony and Languedoc. It is a beautiful old city built mostly of red brick, lying on both sides of the Garonne. It contains several interesting buildings, among them the Romanesque church of St. Sernin (Saturnin), consecrated 1096 and said to be the most perfect Renaissance building in France, the cathedral of St. Etienne (thirteenth century), and the museum of painting and sculpture. Toulouse was the ancient capital of Languedoc. It was the scene of Huguenot massacres in 1562 and 1572, and of Albigensian persecu-

tions, and here in 1814 Wellington defeated Soult; p. 180,771.

Touraine, an ancient province of France, now forming the department of Indre-et-Loire. It was known as the 'garden of France,' from the fertility of its valleys, and was noted for its excellent wine. Tours was the capital. At first ruled by its counts, Touraine was in 1044 ceded to Anjou, and with it formed part of the French possessions of the Plantagenet kings of England. It passed back in the 13th century, and was incorporated with France in 1584.

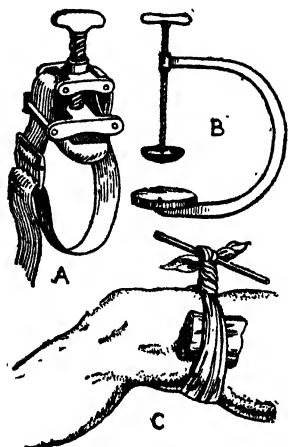
Tourcoing, town, France, in the department of Nord; 10 m. n.e. of Lille. It has important manufactures of wool, cotton, and carpets. In the Great War it was occupied by the German forces (1914), and retaken by the British (1918); p. 81,379.

Tourmaline, a mineral of complex composition, containing aluminium, boron, sodium, iron, magnesium, fluorine, silica, and water as its principal ingredients. Common tourmaline or schorl is black, and occurs as grains, fibrous masses, or radiate aggregates, which are very common in some granitic countries. All varieties of tourmaline, with the exception of the colorless varieties, are intensely dichroic; and this property not only serves to distinguish tourmaline from other precious stones, but also makes it of use for optical purposes. Blue, green, and red varieties of tourmaline are less dichroic than the brown and black. The red (*rubellite*) is found in Siberia, the United States, and Ceylon, and when of good color is used for jewelry.

Tourmente, a sudden snowstorm that occurs from time to time in the Alps, and is much dreaded by chamois hunters and mountaineers.

Tournament, or **Joust**, a species of combat in the middle ages, in which the parties engaged for the purpose of exercising and exhibiting their courage, prowess, and skill in arms on horseback. It took its rise after the establishment of the feudal system, but they were not greatly in vogue till the reign of Richard Coeur-de-Lion. The institution continued to flourish from that time down to the middle of the 16th century. The accident of Henry II. of France meeting his death at a tournament (1559) occasioned the cessation of the practice everywhere. Details of the forms and ceremonies observed will be found in Froissart and other old chroniclers. Chaucer's *The Knight's Tale*, and Scott's *Ivanhoe* or his *Essay on Chivalry*.

Tourniquet, a surgical instrument employed to compress an artery, and thus to arrest or control hemorrhage. The usual form was devised by a French surgeon, Morel, at Besançon, in 1674. But the use of this, and of the similar Petit's tourniquet, has in many hands given way to an elastic tourniquet used with Esmarch's bandage. The older instrument consists of a pad which is placed



Forms of Tourniquet.

A, Petit's tourniquet; B, Lister's tourniquet for aorta; C, Extemporized tourniquet.

over the blood vessel, and a band which surrounds the limb. By means of a screw the band is tightened and sufficient pressure is brought to bear upon the pad to occlude the vessel. An extempore tourniquet may be improvised from a pocket handkerchief knotted round a limb. Pressure is applied by rotating a short stick passed under the knot. A tourniquet must be applied over the artery at some point between the wound and the heart.

Tours (anc. *Caesarodunum*), formerly cap. of old prov. of Touraine, and now cap. of dep. Indre-et-Loire, France, on l. bk. of Loire. Its 12th-century cathedral contains a beautiful monument to the children of Charles VIII. The ruins of Plessisles-Tours are in the vicinity. In 732, Charles Martel defeated the Saracens near Tours; p. 77, 192.

Tours, Frank E. (1877-), composer and conductor, born in London. He has been musical director of several London theatres and of the Winter Garden, the Century and other New York theatres. He is now musical

director of the Paramount Famous Lasky Studios. His compositions include comic operas and songs. Among the latter are *Mother o' Mine*, *In Flanders Fields* and *Trees*.

Toussaint l'Ouverture (1743-1803), West Indian revolutionist born in Haiti; a full-blooded negro. In 1794 he joined the French Republicans, carrying with him the whole body of negroes, and was then made commander-in-chief of the island, the British and royalists clearing out in 1798. He afterwards became president, and raised the island to a surprising height of prosperity. Bonaparte eventually forced him to capitulate, when he was treacherously seized, and sent as a prisoner to France, where he died in captivity.

Towanda, bor. Pa., co. seat of Bradford co. It is the leading trade center for a large agricultural, dairying, and stock-raising district; p. 4, 154.

Tower, Charlemagne (1848-1923), American capitalist and diplomat, born in Philadelphia. In 1897 he became minister to Austria-Hungary. He was transferred as ambassador to Russia in 1899, and in 1902 succeeded Andrew D. White as ambassador to Germany. He made the most complete collection in existence of American colonial laws, and this collection is now in the library of the Pennsylvania Historical Society.

Tower of London, England, on the n. bank of the Thames, was from a very early period employed as a state prison, and was the place of execution of those who were condemned to death for high treason and other state offences. It consists of a keep 90 ft. high, called the White Tower, surrounded by towers, barracks, and armories—the whole area extending to about 13 acres, surrounded by a moat. The regalia of England is now housed within the Tower.

Townsend, Edward Waterman (1855-1942), American journalist and author, born in Cleveland, O. He began newspaper work upon the *Sun* and *Herald* in New York city in 1880, after an apprenticeship upon country journals, his articles describing city life in a semi-humorous way, often in street-arab dialect, proving highly popular.

Townsend Plan. In 1934 Dr. Francis Everett Townsend of California originated a plan of old-age pensions. He proposed to pay every U. S. citizen over 60 years of age (except habitual criminals) a pension of \$200 per month, on condition that he or she retire from remunerative labor and agree to spend the whole amount within the month

in the U. S. To raise the money needed for this pension (about \$20,000,000 per year was his estimate, he suggested a Federal tax, in the form of a retail sales tax or a tax on financial transactions. The proposal was rejected by an overwhelming vote in Congress in 1935 and again in June, 1939.

Townshend Acts. A number of acts dealing with the American colonies proposed to and carried through Parliament in 1767 by Charles Townshend, chancellor of the exchequer. The measures were of three kinds: By one act the legislative functions of the New York assembly were suspended in punishment for that colony's refusing to obey the Mutiny Act and furnish the British troops quartered there with food and shelter. By another act a board of commissioners of the customs was established in America for the purpose of executing the Acts of Trade. By a third act the policy of taxing America was resumed, and duties were imposed at American ports upon glass, red and white lead, painter's colors, paper, and tea. The new laws aroused a great storm of indignation in the colonies. Opposition continued so strong that in 1769 all the duties were repealed except that on tea. The agitation caused by the efforts to collect this duty later culminated in the celebrated Boston 'Tea Party.'

Township, or Town. In New England the township, or as it is more commonly known, the town, is the most important unit of local government. Excepting in northern Maine, where the towns have been laid out by the rectangular survey system and consist of an area six miles square, the New England towns are irregular in shape, and contain from twenty to forty square miles.

A New England town may include within its boundaries several villages. The principal authority is the town meeting, or assembly of electors. The most important town officers are the selectmen. Among their duties are the care of highways, the granting of licenses, the conducting of elections, and the management of the town property. Next in importance is the town clerk, who performs most of the duties devolving in other states upon the county clerk. In the middle states, from New York to Nebraska, the township exists, but is a far less important unit of government. In the Southern states the county, rather than the township, is the unit of local government.

The term township is also applied to the unit employed by the United States in sur-

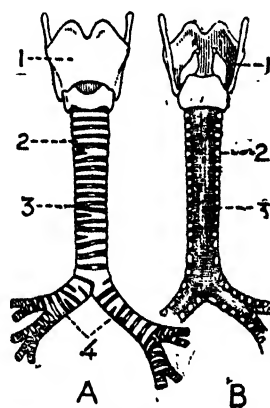
veying the public domain. The township in this sense consists of an area bounded by north and south and east and west lines, containing as nearly as possible thirty-six sections of one square mile each. Upon the settlement of the country these townships were usually continued as civil townships.

Toxicology, the branch of medical science which deals with poisons and their antidotes, and with the effects of excessive doses of medicinal agents. Toxicology derives much of its importance from crime and from criminal attempts, and it therefore falls within the scope of medical jurisprudence as well as of medicine.

Toxins. See Serum.

Toys, playthings for young children. Egypt, in her tombs, has furnished jointed dolls, puppets, balls, crocodiles with movable jaws; Rome also, dolls, miniature vases, bows and arrows, hoops, tops. Since 1852 patents have come thick and fast in all countries of the world, but especially in France. Quantities of toys are made in the United States.

Tracery, the stone framework in the head of Gothic windows, formed by a continuation of the mullions, bent, as it were, into ornamental designs.



Trachea.

A. Front view. B. Back view. 1, Larynx; 2, cartilages of the trachea; 3, fibrous membrane; 4, bronchi.

Trachea, or Windpipe, is a nearly cylindrical tube, composed of cartilaginous and membranous tissues, and extending downward from the lower part of the larynx to the level of the third dorsal vertebra, where it bifurcates into the two bronchi. It is about four and a half inches in length and about three-quarters of an inch in diameter.

union in that particular industry while in the employ of the firm. This weapon made it possible for hostile employers to keep unionism out of their plants.

The modern method of employing the *boycott* is to issue a list of manufacturers and merchants whom trade unionists are discouraged from patronizing, or even forbidden to have any business dealings with. The legality of the boycott has been bitterly contested in the courts of the United States, and in 1908 and 1915 the famous Danbury Hatters' Case was carried to the Supreme Court, which decided that the boycotting of a manufacturer's products sold in more than one State was a combination in restraint of trade under the Federal Sherman Anti-Trust Act. In many trades machines have eliminated the human factor entirely. This displacement of labor caused by automatic machinery is called *Technological Unemployment*.

For many years the A. F. of L. had enjoyed a period without competition in its own fields from other labor organizations. In 1935, however, John L. Lewis, long-time president of the United Miners, was appointed head of the A. F. of L.'s Committee for Industrial Organization, the duty of which was to organize vertical unions in mass production industries. The A. F. of L. had always organized horizontally by crafts. Soon the Committee was in competition with its parent in plants where some workers were already in craft unions. Bitter fighting broke out in labor ranks and the Committee, which refused to follow the wishes of its creator, was kicked out of the A. F. of L. and became the Congress of Industrial Organizations. After passage of the National Labor Relations Act, came the C. I. O.-sponsored sitdown strikes, 1936 and a major strike in the steel industry. The jurisdictional battles between the A. F. of L. and the C. I. O. have been costly to workers, industry, and public alike, many strikes being called where working conditions were satisfactory simply because the members of one union would not work with members of the other. On several occasions Pres. Roosevelt appealed in vain for labor peace.

The National Labor Relations Act, popularly known as the Wagner Act, was passed in 1935, and under its provisions was constituted the National Labor Relations Board, whose three members were appointed by President Roosevelt. Some employers charged that this Board was antagonistic to industry and to working people not belonging to labor

unions, and that its rulings had fostered strikes and disorder and had retarded the return of prosperity.

In China the government established in 1942 model labor organizations for industry and agriculture. The Wartime People's Organization Act of February, 1942, made it obligatory for workers to belong to their local trade associations. These associations, integrated in each industrial area in a central organization, were required to promote cooperative stores, clinics, canteens, and employment exchanges.

Trade Winds, so called from their steady course, are met with between the latitudes of 7° to 29° n. and 3° to 20° s. North of the equator this wind blows almost constantly from the n.e., while s. of the equator the prevailing direction is s.e. The distribution of barometric pressure which brings about the permanency of the trade winds is in a belt, of comparatively high pressure from 30.00 to 30.20 inches, which encircles the globe at the tropics both n. and s. of the equator, while over the equator and the immediate vicinity to 10° or 15° n. and s. the barometric pressure is from one-tenth to two-tenths of an inch less. Permanent winds blow from these respective areas of high pressure toward the low pressure, hence causing the n.e. trades of the Tropic of Cancer and the s.e. trades of the Tropic of Capricorn. Above the n.e. trades the upper aerial currents are from the s.w., and in the Southern Hemisphere from the n.w. (They are the anti-trades.)

Trading With the Enemy Act, an Act approved by the President of the United States on Oct. 6, 1917, which conferred upon him wide powers to deal effectively with abnormal conditions of trade created by the World War I and exigencies of public safety. By the terms of this Act the President is empowered to regulate trade with the nation's enemies and their allies. On Oct. 14, 1917, the President issued a proclamation putting into effect the powers thus vested in him. A War Trade Board was created to take over the duties of the Exports Administration Board. An advisory War Trade Council was created; the powers of the Alien Property Custodian were defined; a Board of Censorship was named; and certain of the powers vested in the President were directed to be exercised through various Departments.

Traducianism, the doctrine that the souls as well as the bodies of men come into existence by natural generation.

Trafalgar, Cape, a low promontory on

the southern coast of Spain, at the western entrance to the Strait of Gibraltar, about 30 m. n.w. of Tarifa. It is memorable for the victory of the British fleet under Nelson over the combined fleets of France and Spain under Villeneuve. (Oct. 21, 1805.)

Trailer, motorless car designed for towing by automobile. Trailers range from homemade vehicles with few conveniences to elaborate ones, costing several thousand dollars, with all the comforts of a fine home, sleeping quarters, a parlor, dining room, showers, toilets, a kitchen, wardrobes, radio, etc. It is estimated that about 1,000,000 persons in the U. S. are living in trailers, migrating about the country following employment or the seasons. In many locations there are elaborate trailer camps where visiting trailers can plug into water and electric systems. The growth of trailer travel since 1930 has brought about the enactment of many state laws governing safety and sanitary conditions. In 1939 there were about 75,000 trailers in operation in the U. S. Commercial trailers, with capacities ranging from $\frac{1}{4}$ ton to 20 tons, are becoming an important part of trucking.

Training Stations, Naval. Sea-going training ships for the instruction and training of recruits became obsolete in most navies several years ago. When the United States entered World War I (1917), the Navy possessed four training stations for recruits—one at Newport (capacity, 2,000 men), one at Norfolk (1,000), one at San Francisco (600), and one at Lake Bluff, near Chicago (2,500). Plans had already been made for expanding the existing stations. These were carried out, and other stations were planned and built. At the close of hostilities the naval training stations, schools, and camps had a capacity, about 90,000.

Trajan (Marcus Ulpius Trajanus) (52 or 53-117 A.D.), emperor of Rome from 98 to 117 A.D., was a native of Italica, a town near Hispalis (Seville), in Spain. He was the first Roman emperor not of Italian birth. His reign was largely occupied with military affairs—the Dacian Wars, a war with Parthia in which he took Armenia and Mesopotamia and descended the Tigris almost to its mouth. He endeavored to improve agriculture in Italy, and restored the harbors of Ostia and Centumcellæ; he also provided institutions for the education and maintenance of poor Italian children.

See works on Trajan by Francke (1840), Dierauer (1868), De la Berge (1877) and

Merivale; also histories of the Roman Empire by Greenidge and Duruy.

Trajan's Column erected at Rome in A.D. 114 celebrated the Emperor's Dacian victories.

Trance, a sleep-like state from which the patient cannot be roused as from sleep. It is usually hysterical in character, and occurs most frequently in females between the ages of twelve and thirty. In rare instances trance has been produced voluntarily, and minor degrees may be induced by hypnotism. Usually consciousness is in abeyance, and the patient preserves no recollection of what has passed during the trance but in some cases consciousness and memory remain active, volition only being abolished. Treatment must be adopted to rouse the patient and to maintain the function of nutrition. Strong faradization of the muscles is of service.

Tranent, burgh, E. Lothian, Scotland, 9 m. e. of Edinburgh, in a coal mining district. The oldest coal mining charter in the United Kingdom dating from 1202 is held by Tranent. It also has the remaining part of a church believed to have been erected in 11th century; p. 4500.

Trani, town and seaport, Italy, in the province of Bari, on the Adriatic. The town is an important center of the wine trade exporting large quantities of strong red wine; p. 39,000.

Trans-Alai, mountain range of Russian Central Asia, in Fergana province, forming an extreme southwestern outlier of the Tianshan system.

Transcasian Province. See **Turkmenistan**.

Transcasian Railway, a railway built by the Russian government from Krasnovodsk (40° n. lat.) on the eastern side of the Caspian Sea, along the southern side of the Kara-kum desert to the oasis of Merv, a distance of 870 m., whence it branches n.e. to Bokhara, Samarkand, and Andijan in Fergana, and s. to Kushk on the frontier of Afghanistan.

Transcaucasia, that part of the old Russian empire lying s. of the main chain of the Caucasus range. It now comprises the republics of Azerbaijan, Armenia, and Georgia which together constitute the Transcasian Federation of Soviet Republics, federated with Soviet Russia. See under their names. See also **TURKMENISTAN**, **CAUCASUS**.

Transcendentalism. Between transcendental and transcendent Kant drew a distinction. By 'transcendental' he designates the

non-experimental, *a priori* elements of thought—especially the forms and categories (space and time, causality, etc.) which, though not products of experience, are manifested only in experience, and contribute to all experiential knowledge. 'Transcendent' Kant reserves for those among the transcendental or *a priori* elements that transcend and lie beyond all experience, and are so far illegitimate as cog-

phase current, etc. A transformer proper, or static transformer, consists essentially of two coils wound on a common laminated iron core. One of these coils, termed the primary, is supplied with an alternating current, which gives rise to an alternating magnetization or 'magnetic flux' in the iron core. For the sake of simplicity of construction, the core stampings are generally rectangular; hence, in order



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Naval Training Station at Newport, R. I.

nitions (though *belief* in them may be attained in other ways). Such are the 'ideas of the pure reason,' God, an immaterial soul, etc. In the United States the term Transcendentalism is applied to the various phases of idealism which found expression in New England in the second quarter of the 19th century. The group of Transcendentalists, of whom Ralph Waldo Emerson was the leader, were followers of Kant. Their philosophy, produced by imposing certain elements of German idealism upon American Unitarianism, was a sort of mystical idealism built on pragmatic principles.

Transept, in architecture, the transverse arm of a cruciform church.

Transfiguration, Feast of the, an ecclesiastical festival, kept on August 6, commemorating the transfiguration of Jesus Christ. It is called in the Greek Church the Feast of Tabor, and was known anciently in England as 'the overforming of our Lord on the Mount Tabor.'

Transformer, a device for effecting the transformation of electrical energy from one form to another, as of high-pressure continuous or alternating current into low-pressure current, of alternating into continuous current or *vice versa*, of two-phase into three-

to provide a closed magnetic circuit, joints become necessary. The better the joint, the less will be the amount of current necessary

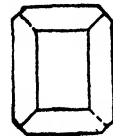


Fig. 1.

to produce a given magnetic flux, or number of magnetic lines. Fig. 1 shows the core of a particular type of transformer. Fig. 2 shows the coils in position, *p* and *s* standing for the primary and secondary respectively.

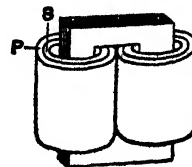


Fig. 2.

Transformers are built in all sizes from the very small ones used in radio sets up to 20,000 kilowatts, and larger. There is no piece

of electrical machinery which gives more satisfactory performance than the transformer. If it is protected from lightning and other high-voltage disturbance, its depreciation is very slight and it requires but little attention. If the transformer is used for passing from a high to a low pressure, it is called a step-

currents to the primary windings of step-down transformers installed at or near the houses to be lighted. The transformers receiving small currents at high voltage deliver to their secondary circuits, or consumers' lamps, strong currents at low voltage.

When the district to be lighted becomes thickly built up, it is more economical to have one large transformer supply a number of houses than to have a separate small transformer for each house. As pointed out by Steinmetz, it is possible to transform by means of static transformers with suitable windings from any polyphase system to any other polyphase system, *i.e.*, from two-phase to three-phase or three-phase to six-phase, etc. Inasmuch as the balanced polyphase system delivers constant power and the single-phase system is inherently pulsating power, there is no method of using static transformers for transforming from single-phase to polyphase or *vice versa*. Such transformation is commercially accomplished by means of rotating machinery. In order to save floor space, reduce cost, and increase efficiency, three-phase transformers are used in certain applications, instead of three single-phase transformers on three-phase circuits.

An induction regulator is a variable voltage transformer used for boosting the voltage of a feeder circuit. The single-phase regulator consists of a primary and secondary winding arranged so that one may be rotated with respect to the other, thus changing the flux interlinkage as the relative position is changed. The polyphase feeder regulator is similar to the single-phase regulator in its effect, but the secondary voltage added is numerically constant with change of position, and the effective change of voltage is obtained by the angle at which the secondary voltage is added to the primary. This angle is varied by changing the position of rotor which is controlled automatically, as in the case of the single-phase regulator.

Instrument Transformers are transformers used to reduce voltage or current to values suitable for using in meters or relays and insulate the instruments from the circuit. These are normally classed as potential or voltage transformers. The Constant Current Transformer is a transformer designed to permit the leakage flux to be varied by separating the primary and secondary windings.

Transfusion of Blood, a therapeutic procedure consisting in the addition of a portion of the blood of one person (the donor)



Rotor

down transformer; if from a low to a high pressure, a step-up transformer. Transformers are used in connection with every system of alternating-current distribution for effecting the changes of pressure which are necessary for economical working. In sparsely settled districts electric lighting is usually effected by means of a high-pressure system of small-sized copper mains supported overhead on poles. These mains carry relatively small

to the circulation of another (the recipient) under such conditions that the latter may receive the benefit of the added blood without disturbance therefrom.

Transit, the passage of one heavenly body over the disc of another, as of Mercury or Venus over the disc of the sun, or of a satellite over its primary. A transit of Mercury or Venus can take place only when the planet passes the sun at the time it is near one of its nodes.

Transit Instrument, an astronomical apparatus invented by Olaus Roemer in 1689, for ascertaining the time of star transits across the meridian. It consists of a telescope mounted on a rigid horizontal axis perpendicular to the tube, fixed in an e. and. w. direction, and turning on pivots set in bearings shaped like the letter Y. A reticle, composed of five or more vertical and a few horizontal spider-lines (called 'wires'), is placed at the focal plane of object-glass near eye end. When observer notes bisection of a star by the central wire he marks, with aid of a clock or chronograph, the instant of its transit.

Transjordan (Hashemite Kingdom of Jordan since 1949), was Arab state in Asia Minor; mandated by League of Nations, 1923; became independent, 1946; area, 34,740 sq. m.; p. (1950, est.) 1,500,000.

Transmigration. The doctrine of metempsychosis, or the transmigration of the human soul after death into a living human body as yet unendowed with a soul, or otherwise into the body of one of the lower animals, or even into a plant, is popularly associated with the Greek philosopher Pythagoras. But the belief in metempsychosis is obviously of much older date than Pythagoras. Its most fruitful field is India, where it thoroughly permeates the native religions. Moreover, it is found among races having no near contact with Europe and Asia. See Frazer, *Golden Bough* (1900).

Transpiration, the evaporation of water vapor from the surface of plants. In flowering plants the evaporation is mainly through the stomata or leaf pores. The rate is increased by light, motion of air, warmth, humidity, etc. By the accompanying fall in temperature, transpiration enables the plant to live, and also is advantageous in promoting the rise of sap in the plant and its inflow of mineral solutions from the soil. See **PLANTS**.

Transplanting. The operation of removing living plants to new positions in the soil.

It is commonly practised with such plants as cabbage, tomatoes, celery, tobacco, etc., which are first sown in seed beds where they can be easily protected from cold, insects, and the like, and then removed to the field when conditions admit. Sometimes plants are transplanted two or three times before setting in the field, for the purpose of inducing stockiness and a strong root system. Large plants like mature trees can be successfully transplanted in a dormant condition by suitable machinery and removing with the tree roots a large ball of earth. The transplanting of nursery stock in orchards is done either in fall or early spring while a dormant condition exists.

Transportation. See **Railroads**; **Shipping**; **Trade**.

Transporter Bridge, a type of bridge invented by Charles Smith in 1872, which is like an ordinary truss or suspension bridge, but is placed sufficiently high to allow of the tallest masted ships passing freely underneath it. The girders form a horizontal railway, and on this runs a trolley, from which is suspended a transporter car. This, travelling at a low level, carries across passengers and freight. Such a bridge at Duluth, Minn., takes the place of a ferry.

Transposing, in music, is changing a piece of music in performance from the key in which it is written to another key.

Trans-Siberian Railway. See **Siberian Railway**.

Transubstantiation, a theological term expressive of the nature and extent of the change which is wrought in the consecrated elements in the celebration of the Eucharist. The doctrine may be stated to be that, while the accidents of the bread and wine (as the color, smell, taste, etc.) continue, the whole substance of the bread is transmuted into the actual substance of Christ's body, and the whole substance of the wine into the actual substance of His blood. Transubstantiation is a doctrine not only of the Roman Catholic, but also of the Greek Church. This dogma was repudiated by the Anglican Church in the twenty-eighth Article.

Transvaal, formerly called the **South African Republic**, now a province of the Union of South Africa, is situated in the southeastern part of the African continent, and is bounded by Rhodesia on the n., by Portuguese East Africa and Swaziland on the e., by Natal and the Orange Free State on the s., and by Bechuanaland on the w. Area, 110,7

450 sq. m. The western and greater part of the Transvaal lies within the South African plateau, enclosed on the e. by the Drakenberg Mountains. East of these mountains lies a broad strip of lowland, and beyond this the Lebombo range, forming the eastern boundary. The climate as a whole is dry and healthful, though malaria is prevalent in the low-lying areas during the summer months. There are two sharply defined seasons—summer, lasting from October to March, during which seven-eighths of the rainfall occurs, and winter or the dry season, from April to September. The short, sweet grasses that grow luxuriantly on the high veldt are the most characteristic feature of the vegetation. Grasses and scrub also cover the middle veldt; mimosas grow in the river valleys; and patches of evergreen forest clothe the summits and upper eastern slopes of the Drakenberg.

The larger wild animals have been practically exterminated over most of the province, but game is still plentiful in the low veldt. Troublesome insects abound, notably the tsetse fly. The great wealth of the Transvaal consists in its vast and varied mineral resources. It is the greatest gold-producing country in the world, its annual output amounting to more than half of the world's supply. The most productive mines are located in the Witwatersrand district, or the Rand. Coal occurs over a wide area. Diamonds are obtained from the Premier mine near Pretoria, from which the great Cullinan diamond was taken in 1905. In 1934 the world's fourth largest diamond was discovered in the Elandsfontein alluvial diggings, near Pretoria. It weighed 726 carats and was sold for £63,000. Copper, lead, iron and tin are also found in the Transvaal.

Maize or mealies is the staple crop; wheat, oats, and tobacco are grown; and large quantities of oat hay are harvested. Stock farming is carried on especially in the high veldt. Large numbers of sheep and goats are raised. The population is 3,535,100 and the area 110,450 sq. mi. The chief cities are Johannesburg, p. 519,384, and Pretoria, capital of the Province and administrative capital of the Union, p. 128,621. English and Afrikaans (South African Dutch) are both official languages and education is conducted in each.

Transylvania, formerly an Austrian crownland, incorporated (1867-8) with the kingdom of Hungary and (since 1918) a province of Rumania; Hungary held part, 1940-45; area 22,312 sq. m.; is mainly a

mountainous tableland. Maize, wheat, oats, fruits, tobacco, flax, and hemp are raised; cattle, sheep, and horses are bred; and coal, iron, salt, gold, and other mineral products are obtained. The population in 1930 was 3,217,149, of whom the Rumanians or Wallachs constituted about one-half, the Magyars and their kinsmen the Szeklers about one-fourth, and the Saxons about one-tenth. The chief towns are Koloszar (Cluj), Kronstadt (Brasso) and Hermannstadt (Sibiu). Names in parentheses are the new Rumanian names. In the years immediately preceding the Christian era Transylvania belonged to the Dacians. In 1526, when the Hungarian crown passed to Austria, Transylvania became an independent state. In 1691 it was formally united with the Hungarian crown, and in the Peace of Karlowitz (1699) Austrian sovereignty over the country was recognized. Following the Hungarian revolution of 1848-9 it became an Austrian crownland, but was reincorporated with Hungary in 1867. During World War I Rumanian forces invaded Transylvania (1916). By the Treaty of Trianon the territory was transferred to Rumania. In 1940 part of it was returned to Hungary temporarily.

Trap, a geological term for any dark colored basic igneous rock, such as basalt, dolerite, and diabase. Traps very frequently occur as lava flows and intrusive sheets, and then weather with terraced features. The term is used as a general name for basic rocks which are fine to medium grained.

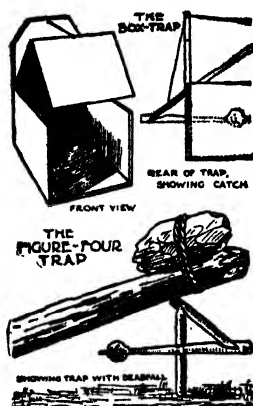
Trapdoor Spider, a name applied to the members of several genera of the family Aviculariidae or typical tarantulas, constituting the sub-family Ctenizinae. They are large, hairy spiders resembling the other tarantulas in appearance, but distinguished by the peculiar architectural skill with which they build their nests.

Trapezium, in geometry. Euclid defined a trapezium as any quadrilateral except a square, an oblong, a rhombus, and a rhomboid.

Trapping, the snaring or capture of wild animals and birds by various devices. In some cases a pitfall or enclosure is used into which an animal is lured, but whence it cannot readily escape. In other devices bait is used, and so arranged that its disturbance by games causes the trap to close or fall, thereby capturing or killing the game. The animals trapped in America include bears, wolves, coyotes, foxes of all sorts, lynxes, rac-

coons, skunks, otters, beavers, fishers, martens, minxes, and weasels.

Trappists, or **Reformed Cistercians**, a branch of the Cistercian order founded in the 17th century at the Abbey of La Trappe, Normandy, by Armand Jean le Bouthillier de Ranc  , who sought to restore the monastic observances of the early Cistercians in



Two Common Forms of Traps.

all their severity. With other religious orders the Trappists were dispersed at the French Revolution and nearly 1,500 members of the order were expelled from France in 1880. The Trappists were introduced into America early in the 19th century. There are monasteries at Gethsemane, Ky., New Mellera, Ia., and Cumberland, R. I., in the United States.

Trap Shooting. See **Pigeon Shooting.**

Travancore, feudatory state at the southwestern angle of India, bounded on the w. by the Indian Ocean, and stretching northward along the coast to Cochin. It is noted for the beauty and variety of its scenery, its healthy climate, and its fertile soil. Chief products, cocoanut, coir, areca nut, pepper, cardamoms, beeswax, and timber. Capital, Trivandrum; p. 73,000. Travancore is one of the best administered and most progressive states of native India. Area, 7,625 sq. m.; p. 4,000,000.

Travertine, a variety of calcisinter whose formation is principally observed in volcanic countries—e.g., near Rome (Tivoli), Naples, and Florence. Many of the finest edifices in Rome, including St. Peter's, both ancient and modern, are built of travertine, obtained from Porte Lucano, near Tivoli. It is usually white or creamy. See **CALC-SINTER**.

Travesty. See **Burlesque**; **Parody**.

Travois, or **Travail**, is a contrivance consisting of two poles lashed at one end to each side of a dog or horse, the other ends trailing on the ground, having also a hurdle lashed from pole to pole to receive a load. It is used by Indians of the North-West and Canadian voyageurs.

Trawling, a method of deep-sea fishing in which the fish are taken in huge bag nets towed along the sea bottom, or by trawl lines. Trawl nets are of two main types—the beam trawl and the otter trawl. A trawl line consists of a long ground line to which shorter lines are attached at frequent intervals. The lines are baited, coiled in tubs, each carrying about 500 hooks, and are set from dories. The end line is attached to a buoy anchor, and the line is paid out by one fisherman as another rows. When sufficient line—sometimes as much as a mile—has been let out, another anchor is attached, and the trawl is allowed to set for a short time, when it is hauled in with the catch. Line trawling is the chief method of fishing for demersal or bottom fish on the banks adjacent to the Atlantic Coast, where it is conducted solely by sailing vessels.

Treason. Under the common law the crime of treason was first defined by the English Statue of treasons, passed in 1351, which recognized two divisions, High and Petty. Treason against the United States is declared by the Constitution (Art. III., Sec. 3) to 'consist only in levying war, or in adhering to its enemies, giving them aid or comfort.' Amendment VIII. of the Constitution prohibits the infliction of cruel or unusual punishment. Death or imprisonment with hard labor for not less than five years together with a fine of not less than \$10,000 is the penalty for treason in the United States.

Treasury, U. S. Department of, an executive department established by Act of Congress in 1789, charged with the collection of Government revenues, the custody and disbursement of public funds, the administration of the currency system, and numerous other functions. It is administered by the Secretary of the Treasury, who is charged by law with the management of the national finances, and is a member of the Cabinet. The fiscal bureaus and offices of the Treasury Department include the following: the Treasurer of the United States; the Controller of the Currency; the Director of the Mint; the Commissioner of Internal Revenue; the Controller of the Treasury; the Register of the

Treasury; the Federal Farm Loan Board; and the Bureau of Engraving and Printing. The Customs Service includes the Division of Customs, charged with the collection of taxes imposed by law upon goods imported into the United States, and the Bureau of War Risk Insurance. Miscellaneous Bureaus and divisions are the Public Health Service; the Coast Guard Service; the Supervising Architect, who oversees the construction and maintenance of public buildings; and the Appointments Division. The Federal Reserve Board, while not under the jurisdiction of the Treasury Department, is closely related to it, and is assigned quarters in the Treasury Building.

Treat, Robert (1622-1710), colonial governor of Connecticut, was born in England. He was deputy governor of Connecticut during 1676-83 and 1698-1708, and governor in 1683-7 and 1689-98. He was one of the leaders in the opposition to the tyrannical encroachments of Sir Edmund Andros.

Treaty, a compact or agreement entered into by two or more sovereign states for the purpose of modifying or defining their mutual duties and obligations. Treaties may be terminated by mutual consent of the contracting parties. They also cease to be binding when their continuance is conditioned upon terms which have ceased to exist, when either party refuses to fulfil a material stipulation, when all the stipulations have been performed, when a signatory party having the option to do so elects to withdraw, when performance becomes morally or physically impossible, and when the state of affairs upon which the treaty was based ceases to exist.

The treaty making power in the United States is vested in the President and the Senate by Article II., section 2, of the Constitution, which provides that the President 'shall have power, by and with the consent of the Senate, to make treaties, provided two-thirds of the Senators present concur.' The power to 'enter into any treaty, alliance, or confederation' is expressly denied to the States. The actual ratification of a treaty, after its acceptance by the Senate, rests with the President, and when so ratified it becomes *ipso facto* the supreme law of the land, anything to the contrary in the laws or constitutions of the various States notwithstanding. Consult S. B. Crandall's *Treaties: Their Making and Enforcement* (1916).

Trebizond, or **Trabzon** (ancient *Trapesus*), seaport, capital of Trebizond vilayet, Turkey, near the s.e. corner of the Black Sea,

on a small plateau 110 m. n.w. of Erzerum. Industries include silk, woolen, and linen weaving, dyeing, and tanning; p. 55,532, including Turks, Armenians, Greeks, and Persians. During World War I it suffered bombardment by the Russians, and in April, 1916, it surrendered to the combined Caucasian army and Black Sea fleet.

Treble, the highest part in concerted vocal or instrumental music. It generally contains the melody and is sung by a soprano voice. For the treble or G clef, see CLEF.

Tree, any woody plant of perennial duration, the natural habit of which is to rise from the ground with a distinct trunk, in contradistinction to a shrub, which naturally produces several stems more or less directly rising from the root. Trees are found in all climates except the coldest. They are usually classified as *deciduous* and *evergreen*.

Tree, Sir Herbert Beerbohm (1853-1917), English actor and theatrical manager, was born in London, and made his *début* at the Globe Theatre as Grimaldi (1878). He was manager of the Comedy, the Haymarket, and Her Majesty's Theatres, where he produced *Seats of the Mighty*, *School for Scandal*, *Trilby*, *Colonel Newcome* (U. S., 1917), and other plays. Especially notable were his elaborate productions of Shakespearean plays.

Tree Ferns, the common name for ferns with arborescent trunks, of which there are many species, all natives of tropical and subtropical countries. Their stems are formed of the consolidated bases of the fronds, surrounding a central column of soft tissue, in which the circulation takes place.

Tree Frog, or **Tree Toad** (*Hylidae*), a family of amphibians more nearly related to toads than to frogs, and spending much of their lives on the trunks and branches of trees. A few species are numerous in the North Temperate zone, and well known to everybody by their piping cries at night. In the United States the Green Tree Toad (*Hyla versicolor*), whose color varies from a dark brown to a lichen-like gray or a brilliant green, is widespread and abundant, and also the little yellow Peeper (*H. pickeringii*) and the Cricket Frog.

Tree Surgery, or **Tree Doctoring**, that branch of arboriculture which has for its object the physical repair of lawn and street trees which have become diseased or weakened by wounds or decay. It includes the removal of dead and diseased branches, and sterilizing and waterproofing the scars; the chaining and bolting of trees, to render them

more secure; and, more especially, the treatment of simple bark wounds, and the filling of deep and decayed cavities.

Tree Toad. See **Tree Frog**.

Tree Worship, an ancient and universal cult. It was prevalent among the Lithuanians prior to the fourteenth century, the oak being specially revered. The oak also was sacred to the Greeks, Celts, Slavs, and the Druids of Britain. The Romans worshipped the sacred fig tree of Romulus. Tree worship originated in the primitive belief that in trees, as in all plants, there dwelt a god or spirit, who in some cases had the power of detaching himself from the tree at will. This latter idea is still prevalent among many tribes of Africa and the Eastern Archipelago.

Trefoil, a name given to many herbaceous plants with leaves of three leaflets, as clover, lotus, medick, buckbeam, etc. The term is used also in architecture, for a three-lobed aperture in tracery, and in heraldry.

Trelawny, Edward John (1792-1881), English author and adventurer, was born in London. In 1822 he met Shelley and Byron in Italy, and was at Leghorn when Shelley was drowned, and performed the last services to his body. In 1823 he accompanied Byron to Greece, and took part in the war of independence. In 1833-5 he traveled in the United States. His life is described in his two vivid works *Adventures of a Younger Son* (1831), and *Records of Shelley, Byron, and the Author* (1878).

Tremolo, as a term in instrumental music, signifies that the notes are to be rapidly reiterated during their time values, instead of being played as sustained sounds. In vocal music the word is used to designate the wavering effect produced when the voice is caused or allowed to become unsteady.

Trench (Military). The military trench is a development in the art of war made necessary by the increasing power and accuracy of modern artillery and small arms. The trench long has been an adjunct of permanent fortifications, but not until the American Civil War did it find any large place in field operations. In every war since, however, the use of trenches has increased, and during the World War they played a most prominent part. Trench systems grew more intricate with the progress of the war, and the fronts formed fortified zones, consisting of a series of trenches extending back for several miles in rear of the front line.

Beginning at the front, the first trench is the firing trench of irregular trace, and divi-

ded by traverses into small sections holding from five to ten men each. About twenty-five yards in rear of the firing trench is a continuous trench called the cover trench. It is connected to the firing trench by communicating trenches at frequent intervals, and affords shelter to the bulk of the garrison. About two hundred yards in rear of the cover trench, and connected with it by frequent communicating trenches, is the support trench which shelters troops for reinforcing immediately the firing trench. From four to six hundred yards in rear of the support trench is the reserve trench, connected with the front by communicating trenches, and with concealed roads and railroads in rear by approach trenches. The reserve is used for counter-attacks in defence. From fifty to seventy-five yards in front of the firing trench is the wire entanglement or other obstacle. All except the approach trenches are narrow and about eight ft. deep, so as to afford complete cover for men standing or walking upright. A berm or firing platform is constructed along the front wall of the firing trenches, to enable men to fire therefrom.

Trench Mortar. See **Field Artillery**.

Trent (anc. *Tridentum*), town in the Trentino, Italy. Points of interest are the Cathedral (13th century), and the church of Santa Maria Maggiore, which was the meeting-place of the famous Council of Trent; p. 30,049.

Trent, river of England, rising in Northwestern Staffordshire and flowing through the counties of Derby, Leicester, Nottingham, and Lincoln, until it joins the Ouse to form the Humber. It is 170 m. in length and is navigable for barges to Burson.

Trent Affair, the episode growing out of the forcible removal of two Confederate envoys from the British mail steamer *Trent* by the U. S. ship *San Jacinto*. In the autumn of 1861 James M. Mason of Virginia and John Slidell of Louisiana were appointed commissioners of the Confederate States to England and France respectively. They escaped from Charleston, through the blockade, Oct. 12, 1861, reached Nassau, Bahama Islands, and then proceeded to Havana, where they took passage, Nov. 7, upon the British mail packet *Trent*. Capt. Charles Wilkes, in command of the U. S. screw sloop *San Jacinto*, determined to intercept the *Trent* and capture the commissioners. In pursuance of this design, the *Trent* was stopped in the Bahama Channel, Nov. 8, and the commissioners were forcibly removed. In England

the news was hailed with indignation as a wanton insult to the British flag. The prospect of war with Great Britain forced the decision to give up the prisoners, and Secretary Seward, in a long communication to Lord Lyons, disavowed the act of Captain Wilkes as done without authority. The British government accepted the release of the prisoners and the apology, though denying the premises upon which the action was based.

Trent, Council of, a famous ecumenical council of the Roman Catholic church held between 1545 and 1563, in Trent, Austria. From a doctrinal and disciplinary point of view it was most important as it fixed the faith and practice of the Roman church in relation to the Protestant Evangelical churches. Its object was to condemn the principles and doctrines of Protestantism, to define the doctrines of the Roman Catholic church on all disputed points, and to effect a reformation in discipline and administration.

Trentino, a former division of Austrian Tyrol, annexed to Italy in 1919. It lies on the southern slope of the Alps, and was the scene of much fighting during the World Wars.

Trenton, city, capital of New Jersey and county seat of Mercer county, is situated at the head of navigation on the Delaware River, and on the Delaware and Raritan Canal; 29 m. n.e. of Philadelphia. Interesting historical features of the city are the old stone barracks built by the British in 1758 during the French and Indian War, and a marble shaft surmounted by a bronze statue of Washington, commemorating the Battle of Trenton. Trenton is an episcopal see of the Roman Catholic and Protestant Episcopal churches. The chief articles of manufacture are pottery, terra-cotta and fire-clay products, rubber tires, tubes and mechanical goods, foundry and machine-shop products, steam turbines, steel cables, wire, bridge materials, and cigars. Trenton holds foremost rank in the manufacture of pottery, utilizing largely clay found in the vicinity. It is the second largest American rubber center. Trenton was first settled in 1680-85, but was not incorporated as a borough until 1746. It is memorable for its historic associations. On Dec. 26, 1776, General Washington here captured a large Hessian force. After the Revolution the Continental Congress met twice in Trenton and it was proposed as the capital of the United States. It became the State capital in 1790 and received its city charter in 1792; p. 124,697.

Trenton, Battle of, a battle of the American Revolution fought in and around Trenton, N. J., Dec. 26, 1776, between a part of the American army under Washington and a force of British and Hessians under Colonel Rall. With 2,400 men and 18 cannon Washington succeeded in crossing about eight m. above Trenton. Though necessarily delayed until after daylight, the attack was a complete surprise. Colonel Rall was mortally wounded and the bulk of his demoralized troops soon surrendered.

Trephine, or **Trepan**. A trephine is a surgical instrument for cutting a circular piece of bone from the cranium. Trephining may also be performed for the removal of a bullet, and in some cases of epilepsy. Bones other than those of the cranium are occasionally trephined to allow of the escape of pus formed in the interior of the bone.

Trespass, a general term denoting a wrongful injury by force to the person or property or an interference with the rights of another. It is also employed to denote a form of action to recover damages for such injuries. Any unauthorized entry upon the lands of another constitutes an act of trespass for which an action will lie. At least nominal damages may be recovered if there was no substantial injury. Treble the amount of the actual damage may be recovered against a trespasser in New York state for entering another's land and cutting timber thereon. Trespass to the person includes all forms of personal injuries, discussed under negligence, assault, false imprisonment, seduction, rape, etc. Trespass to personal property consists in destroying or injuring it, or carrying it away, thereby depriving the owner of its use.

Trevelyan, Sir George Otto (1838-1928), English statesman and author, born at Rothley Temple in Leicestershire. It was to Sir G. Trevelyan, more than to any other man, that the abolition of purchase in the army and the enfranchisement of the agricultural laborer were due. He was a nephew of Lord Macaulay, and wrote his *Life* in 1876, *The Early History of Charles James Fox* (1880), *The American Revolution* (1899-1905), and *Interludes in Verse and Prose* (1905).

Treves, town, Rhine Province, Prussia, on Moselle, is especially noted for its rich Roman remains. These include the basilica or palace of Constantine, now used as a Protestant church; the Porta Nigra, a fortified gate dating from the 4th century; an amphitheatre, capable of accommodating 30,000

spectators; the imperial palace; baths, in capital preservation; and the piers of the river bridge; p. 59,000.

Treves, Sir Frederick (1853-1923), English surgeon, was born at Dorchester. He acquired a great reputation as one of the most skillful of surgeons, while as lecturer on surgery at the London Hospital he proved himself a teacher of no common type.

Trial. The proceedings before a court, with or without a jury, by which the issues of fact and law in an action are determined. Equity causes are commonly heard by a court without a jury; but actions at law in superior courts, and serious criminal cases are tried before a jury. The selection of the jury is the first step in a trial where one is necessary. In criminal trials it is necessary for the defendant to be present in court when the foreman of the jury announces their verdict, but in civil cases very frequently only the counsel are present. After the discharge of the jury the trial is over. See ACTION; EVIDENCE; PROCEDURE.

Trial by Combat. See **Battle**, **Trial by**.

Triangle. (1.) Any figure bounded by three lines which meet at three angles. (2.) A form of percussion instrument used in military bands, and in orchestral music. It consists of a steel rod bent into the form of an isosceles triangle, open at one angle of its base; is held by a string attached to its upper angle; and is sounded by striking it lightly with a short steel rod.

Triangulation. See **Surveying**; **Geodesy**.

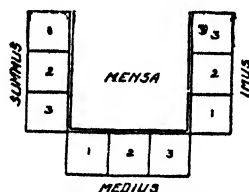
Triassic. The Triassic system, the oldest of the Mesozoic formations, was at one time united with the Permian under the name New Red Sandstone. The name comes from the conspicuous threefold subdivision of this system in Germany—the Bunter, Muschelkalk, and Keuper. The Triassic of North America occurs in a belt along the Atlantic coast, in considerable western interior areas and on the Pacific border. The Pacific border Triassic is chiefly marine, while the interior and Atlantic border representatives are lacustrine, fluvial and possibly estuarine in origin.

Tribune, the designation of various officials in ancient Rome. (1.) Tribunes of the commons (*tribuni plebis*), magistrates granted to the commons (*plebs*) after the secession to the Sacred Mount in 494 B.C. Their persons were inviolable. At first there were two, then five, and after 449 ten. They were elected by the commons in the *comitia tributa*,

or assembly of the tribes. Their power was chiefly negative: it was only when the decrees of the *comitia tributa* became laws (after 287 B.C.) that they undertook most of the legislation of the state. (2.) Military tribunes (*tribuni militum*) were the officers of the legion. There were six to each legion, who took it in turn by twos, month by month, to command.

Trichina (*Trichina spiralis*), a minute parasite, belonging to the nematodes or thread-worms, which occurs in man, pigs, rats and other domesticated and wild animals. See NEMATODES and PARASITES.

Trichiniasis, or **Trichinosis**, the disease caused by infestation of man by the parasitic worm *Trichina*. The encysted larvæ are ingested with infested meat, the developmental cycle being completed in the human host. The first symptoms are nausea and diarrhoea, with other symptoms of gastro-intestinal irritation; followed in the migratory stage of the parasite by rise of temperature and extreme prostration, with pain and swelling of the muscles, great acceleration of the pulse and respiration, profuse sweating, and diarrhoea.



Plan of Triclinium.

Triclinium, in ancient Roman houses, a couch which ran round three sides of a table, leaving one end free for serving the dishes. The word is also used for the dining-room of a Roman house, which usually opened off the peristyle.

Tricolor. See **Flag**.

Trident, a spear with three prongs, generally with pointed barbs, forming a characteristic emblem of Poseidon or Neptune, the sea-god.

Trier. The German name for Treves.

Trierarch, in ancient Greece, the commander of a trireme or war-galley. Among the Athenians this office was one of the burdens which fell upon the wealthier classes.

Trieste, or **Triest**, seaport on the Gulf of Trieste; a Free Territory. Trade in grain, wine, and oil is considerable. Ship-building is carried on, and marine steam-engines, anchors, ropes, soap, leather, and

furniture are manufactured; p. 297,000. Trieste was subjugated by the Romans in 177 B.C. and became a prosperous city. In 1719 it was made a free port by Charles VI. In the 19th century Italian sentiment began to manifest itself and in World War I it was a rallying ground of Italian patriotism. It was ceded to Italy by the treaty of St. Germain in 1918 made a Free Territory by UN 1946; by 1955 London agreement: Zone A (incl. city) to Italy, Zone B to Yugoslavia.

Trifolium, a genus of hardy herbaceous plants belonging to the order Leguminosae. They bear leaves of three leaflets, the stipules being adnate with the leaf-stalks. Among the species are the white or Dutch clover; the red clover; the zigzag clover; the rabbit's-foot clover; and the yellow-flowered hop clovers.

Triforium, the arcaded story between the top of the pier arches and the clerestory of a Gothic church. Behind it is usually a passage-way or ambulatory, frequently lighted by windows in the outer wall, especially in Romanesque work. See BLINDSTORY.

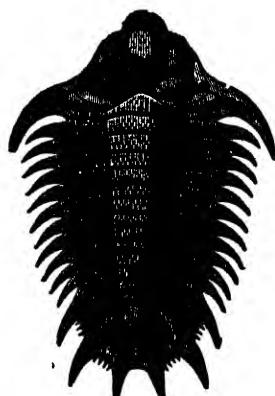
Trigonometry, originally the branch of geometry which had to do with the measurement of plane triangles. This gradually resolved itself into the investigation of the relations between the angles of the triangle. It is easy to show that, if we fix the values of the angles of a triangle, the ratio of the sides containing any one of these angles is the same whatever be the size of the triangle. This ratio is a definite function of the angles; and it is with the properties of such ratios that trigonometry has now to deal. The fundamental ratios are obtained from a right-angled triangle, of which one angle is the angle under consideration. There are two leading problems in trigonometry—the construction of trigonometrical tables for the values of the functions, and their application to measurements. Trigonometry was originally a branch of astronomy, probably of Babylonian origin (Hipparchus, Menelaus). Regiomontanus first made trigonometry a separate science, independent of astronomy. At present trigonometry is a conglomerate, which borrows from synthetic geometry, analytical geometry, and algebra. The construction of trigonometrical tables has busied astronomers and mathematicians of all times. They are now usually incorporated in mathematical or logarithmic tables.

Trikkala (ancient *Trikkh*), town and archiepiscopal see, capital of province of same name, Thessaly, Greece; 36 m. w. of

Larissa. It is in a fruit-growing district, and trades in grain, silk, and tobacco. Cotton and woolen goods and leather are manufactured. It was once famous for its temple of Aesculapius. During World War I it was occupied by the Allies, June, 1917; p. 19,000.

Trillium, a genus of hardy North American herbaceous, perennial plants, belonging to the order Liliaceae. The species are common in woodlands in the United States, and are called *Wake-Robin*, *Three-Leaved Nightshade*, *Indian Shamrock*, etc.

Trilobite, an order of fossil crustacea entirely confined to the Paleozoic rocks. They make their first appearance in the Cambrian, attain a great development in the Silurian, occur sparingly in the Devonian and the Carboniferous, and disappear finally in the



Fossil Trilobite (*T. lichen*).

Permian system. The dorsal surface of the body was covered with a calcareous shell or crust, which is usually trilobed longitudinally—i.e., the lobes extend from head to tail. Some species are very minute, but others, like the *Asaphus gigas*, attain a length of nearly two ft.

Trilogy, the name given by the Greeks to a group of three tragedies, either connected by a common subject, or each representing a distinct story. A satyric drama was customarily added as a termination, whence the whole was sometimes termed a *tetralogy*. We possess only one perfect specimen of the classic trilogy—the *Oresteia* of Aeschylus, which embraces the *Agamemnon*, the *Choephoroe*, and the *Eumenides*.

Trimethylamine $N(CH_3)_3$, a tertiary amine, occurring in herring brine and the blossoms of hawthorn. Trimethylamine is a

gas with a fishy, ammoniacal odor and strong alkaline reaction. When heated with hydrogen chloride it yields methyl chloride, and is used as a source of that substance.

Trimmer, a short cross joist let in between two other joists to carry the ends of intermediate joists, to prevent them from entering a chimney or a window.

Trincomali, seaport, naval station, and magnificent harbor on the n.e. coast of Ceylon. The town is built on a bold peninsula, which divides the inner and outer harbors. Here the Malabar invaders of Ceylon built the 'Temple of a Thousand Columns,' to which pilgrims flocked from all parts of India. The town was held by the Dutch, and subsequently by them and the French alternately, until the capture of Ceylon by the British in 1795; p. 29,500.

Trine, Ralph Waldo (1866-), author, was born in Mount Morris, Ill. After teaching school, working as a bank cashier and as a special newspaper correspondent, and lecturing, he devoted his time to writing. His publications, which have been widely read and translated, include *In Tune with the Infinite; The Higher Powers of Mind and Spirit* (1917); *The Power that Wins* (1929).

Trinidad, the most southerly of the British West Indies, 7 m. from the Venezuelan coast. Next to Jamaica, it is the largest British island in the West Indies, having an area of 1,862 sq. m. Trinidad is structurally a part of South America. The surface is in general level, but there are low mountain ranges along the north and south shores. The climate, though warm and moist, is healthful, and hurricanes are unknown. The mean temperature is 78.6° F., and the average rainfall 66.26 inches. The soil is fertile, and the island is heavily wooded. The fauna is similar to that of the South American continent. The most striking natural feature of the island is the Pitch or Asphalt Lake, about 3 miles in circumference, and 104 acres in extent. The pitch of which it is composed hardens on the surface in unequal masses. The asphalt thus produced is exported in increasing amounts every year. The chief mineral wealth of Trinidad, aside from asphalt, consists in its oil supply. The most important crops are cacao, sugar, vegetables, coconuts, rice, coffee, rubber, and tropical fruits.

The most important of the manufactures is Angostura bitters, of which Trinidad furnishes the world's supply; p. 651,000.

The most important town is Port of Spain, the capital, with a population of 111,350.

(1951). It is one of the finest and cleanest cities in the West Indies, and has a sheltered but shallow harbor. Trinidad was discovered by Columbus in 1498, and in 1797 it fell into the hands of the British who annexed it in 1802.

Trinidad, seaport, city, Cuba, in Santa Clara province, 3 m. by rail from its port, Casildas, on the southern coast, and 180 m. s.e. of Havana. The mild, healthful climate and picturesque scenery attract many native and foreign visitors. Exports include sugar, honey, mahogany, and coffee. It was one of the earliest fortified cities of the New World, and the scene of desperate combats during the time of the buccaneers; p. 43,874.

Trinidad, a small island in the Atlantic Ocean, in 20° 30' s. lat., and 700 m. e. of the coast of Brazil, to which it belongs.

Trinitarians, or **Redemptionists**, a Roman Catholic order founded at Rome in 1198 to redeem Christian captives from the infidels. Their rule was a modification of that of St. Augustine, and they were bound to devote one-third of their revenues to redeeming captives. Branches of the Trinitarians still exist in Rome, Spain, Austria, Northern Africa, and elsewhere, whose members are chiefly engaged in work among negro slaves.

Trinity, The Doctrine of the, a theological doctrine which declares that there are three Persons in the Godhead, the Father, the Son, and the Holy Ghost, and that 'these three are one true, eternal God, the same in substance, equal in power and glory—although distinguished by their personal properties.' An elaborate statement of the doctrine is to be found in the Athanasian Creed.

Trinity College, an institution of learning at Hartford, Conn., founded in 1823 as Washington College. The name was changed in 1845 to the present title.

Trinity College, a Catholic institution for the higher education of women, in Washington, D. C., founded in 1897, and affiliated with the Catholic University of America at Washington. It offers undergraduate and graduate courses.

Trinity Sunday, the Sunday after Whitsunday, hence eight weeks after Easter. It was not a general festival in the West until the time of Pope John XXII. (1334).

Trio, in music, a composition for three voices or for three instruments. The most important form of instrumental trio is that for violin, 'cello, and piano. The term is also applied to a movement in $\frac{3}{4}$ time in a different key, which follows a minuet or other

movement, and leads back to the previous movement in the original key.

Trional, a pure white, crystalline compound with the formula $(C_2H_5)(CH_3) - C(SO_2C_2H_5)_2$. Used in medicine as an hypnotic, it has no injurious after effects, and is not habit-forming.

Tripe, parts of the compound of a ruminant, especially of sheep or horned cattle, prepared as food. The parts used are the paunch or rumen (yielding plain tripe) and the smaller reticulum (yielding honeycomb tripe).

Triple Alliances. The first famous triple alliance was concluded in 1668 between England, Holland, and Sweden in order to check the aggressive policy of Louis XIV., who had overrun the Spanish Netherlands. In 1717 England, France, and Holland made an alliance which tended to the preservation of the peace of Europe for many years. In 1788 England, Prussia, and Holland allied, and for some four years this triple alliance to a great extent gave the law to Europe.

In 1872 Russia, Austria, and Germany united in the League of the Three Emperors. Its conclusion was due to Bismarck's anxiety to preserve the peace of Europe. In 1882 Italy joined Germany and Austria, which had allied in 1879. At the outbreak of the Great War, however, Italy refused to join Germany and Austria, and in 1915 formally withdrew from the alliance. See **ALLIANCE**.

Triple Entente, a name given to various diplomatic agreements between Great Britain, France and Russia, probably brought about by the formation of the Triple Alliance between Germany, Austria and Italy. On the outbreak of the European War the three powers agreed not to make a separate peace with Germany and Austria and also that when the terms of peace were discussed no one of the three should demand conditions of peace without a previous agreement with the other two.

Tripoli, or **Tripolite**, a mineral substance employed in polishing metals, marble, or glass, so named because it was originally brought from Tripoli in Africa. It is a siliceous rock, composed of the siliceous frustules of *Diatomacææ*.

Tripoli, a province of Libya, formerly in the possession of Italy. Once a Turkish vilayet, it stretches 1,000 m. along the northern coast of Africa, between Tunis and Egypt, and comprises the two districts Tripolitania and Cyrenaica. Its *hinterland* is somewhat uncertain, but extends inland for about

800 miles, taking in Fezzan. The area is estimated at about 975,000 sq. m., and the population at 717,270.

Sheep and cattle are raised in considerable numbers, and there are hardy breeds of excellent horses and mules. There are fisheries on the coast, and the sponge industry is of importance.

The chief exports are barley, cattle and sheep, ivory, ostrich feathers, esparto grass, skins and hides, sponges, and rubber.

Because of its location, Tripoli has been called the 'Gateway of the Sahara,' and it was formerly an important market for the caravan trade from Central Africa. Tripoli was administered under the Italian colonial ministry, Cyrenaica and Tripolitania each having a governor, a secretary-general for civil and political affairs, a chief of staff, and a chief of the political-military office.

The principal cities are Tripoli, with a population of about 71,000; Benghazi, Mesurata, Homs.

Early in the eighth century Tripoli was conquered by the Arabs. In 1510 it was taken by Spain, and in 1551 surrendered to Turkey. It joined in the general piracy of the Barbary States, and several European countries found it necessary to send fleets to bombard its capital, while the United States twice made war on it. After protracted negotiations regarding the rights of Italian citizens in Tripoli, war broke out between Italy and Turkey in 1911. An Italian army landed in Tripoli, and on Nov. 5, 1911, Italy annexed Tripoli. At the close of World War I Italy began to govern through native chiefs, and in 1919 gave the country 'local citizenship,' with an elective assembly. Tripoli came under Allied control in May, 1943.

Tripoli, city, capital of the province of Tripolitania, situated on the coast, in the western part of Tripoli; p. 86,137.

Tripoli, capital of sanjak of Tripoli, in the vilayet of Beirut, Syria; 40 m. n.e. of Beirut, and 2½ m. from its port, El Mina. It has overland trade with Aleppo, and exports silk, grain, wool, fruit, eggs, and sponges. The old town was an important port in Phœnician times. There is a castle; p., (including El Mina) 37,260.

Tripolitania, western province on the northern shore of Africa, one of the two administrative divisions of Libya; p. 552,663. The capital and principal port is Tripoli. Tobacco and fruit are exported.

Tripolite, a name sometimes applied to diatomaceous earth, although more correctly

it is given to siliceous rocks which are used for abrasive purposes.

Tripos, the name applied to the final examination for honors in Cambridge University, England.

Triptych, originally a writing table of three leaves. The term is now generally applied to a work of art, often an altarpiece, which consists of three panels in juxtaposition. They are joined together by hinges and can be folded so that different sides are exposed.

Trireme, an ancient form of ship of war. It was propelled mainly by oars (though it had a mast and sails), which were arranged in three banks or tiers, one above another. Triremes were invented in Phœnicia; they were introduced into Greece probably in the sixth century, B.C. About 350 B.C., they were superseded by quadriremes and quinqueremes.



Roman Trireme.

Trisagion, or **Tersanctus** ('thrice holy'), an ancient liturgical formula. It is used in the mass of the Roman Catholic Church, and the communion service of the Anglican churches just before the prayer of humble access which precedes the consecration of the elements.

Tristan, or **Tristram**, the hero of an ancient legend, was reared at the court of his uncle, King Mark of Cornwall. Wounded in combat by Morault, brother of the Queen of Ireland, who had come to demand tribute of King Mark, he went to Ireland and was healed by Iseult, daughter of the Queen. On his return to Cornwall he brought glowing accounts of the beautiful princess and was sent back to ask her as Mark's bride. Iseult and Tristan fell desperately in love but she married Mark while still contriving many meetings with her lover. At length the lovers were discovered and Tristan fled to Brittany, where he eventually married another Iseult. Sometime later being badly wounded he sent for Iseult of Cornwall to come to his aid, instructing his messenger that if she consented, the ship bringing her should bear

white sails and if she refused, black. Iseult hastened to him, but his wife, Iseult of Brittany, in jealous rage told Tristan that the incoming sails were black, and he at once expired. Upon learning of his death Iseult of Cornwall fell lifeless on his body. King Mark buried the lovers in one grave, planting a vine over Tristan and a rose over Iseult, the two becoming so intertwined that they could not be separated. Interest in the legend has been kept alive by Richard Wagner's great musical drama *Tristan and Isolde*, based upon Gottfried's poem; this, and Swinburne's *Tristram of Lyonesse*, and E. A. Robinson's *Tristram* are beautiful modern renderings of the famous tale.

Triton, a name sometimes given to the newt; and also used for a genus of gasteropods with large handsome shells, most of whose members are found in warm seas.

Triton, in ancient Greek mythology, a son of Poseidon and Amphitrite, who dwelt in a golden palace at the bottom of the sea. This is Hesiod's account; later writers speak of tritons in the plural, and generally as human above the waist and fish-like below. In poetry and art they are distinguished by trumpets which they blow to calm the stormy waves.

Tritonia, a genus of South African bulbous plants belonging to the order Iridaceae. Among the species are the garden plants known as Montbretias.

Triumph, the celebration at Rome of a victory by a successful general. It was granted by the Senate, and on the day of the celebration, the general, drawn in a chariot by four horses, was met by the Senate and magistrates at the triumphal gate. There a procession was formed, which included the principal captives of the enemy, the victorious general and his whole army. After 14 B.C. the emperor ceased to allow triumphs to any generals except members of the imperial house.

Triumvir, in ancient Rome the designation of officials who belonged to various boards of three members. Of the two famous triumvirates, the first was a mere private compact between Julius Cæsar, Pompey, and Crassus in 59 B.C., and had no constitutional basis; the second, formed in 43 B.C. between Octavian (Augustus), Antony, and Lepidus, was formally established by decree of the people 'to settle the constitution.'

Trocadéro, the name given to an elevated bit of land in Paris, on the right bank of the Seine, opposite the Pont d'Iéna. The ground

was laid out in terraces for the exhibition of 1867, and on it for the exposition of 1878 the Palace of the Trocadéro was erected.

Trochee, a metrical foot consisting of two syllables, the first long, the second short; or, in the accentual system of English, the first accented, the second unaccented.

Troglodytes, or **Cave Dwellers**, a name applied to certain ancient tribes in Mauritania, North Africa, the Arabian coast of the Red Sea, and the opposite coasts of Egypt and Ethiopia, but especially to those on the Red Sea coasts.

Trollope, Anthony (1815-82), English novelist, was born in London. It was not until the publication of *The Warden*, in 1855, that he attracted any attention. He travelled in the United States several times and often his novels were published serially in both British and American magazines. Trollope is one of the best of English story tellers. He is particularly good in portraying cathedral towns, and the British clergy of his day. Among his works are *Barchester Towers* (1857); *Dr. Thorne* (1858); *The Bertrams* (1859); *Framley Parsonage* (1861); *Orley*



Trotters on Track. Mineola, L. I.

Troilus, in ancient Greek legend, a son of Priam, king of Troy, and Hecuba, who was killed by Achilles. The story of his love for Cressida, which is the subject of Shakespeare's *Troilus and Cressida*, is derived from mediæval romances on the tale of Troy.

Trojan War, a legendary war between Greece and Troy, said to have occurred about the beginning of the 12th century B.C. It was undertaken by the Greeks to recover Helen, wife of Menelaus of Sparta, who, because of her beauty, had been carried off by Paris, son of Priam, king of Troy. Agamemnon, Achilles, Nestor, Diomedes and other Greek heroes assembled at Aulis with some 100,000 men and 1,200 ships and proceeded to Troy where their demand for Helen was refused. They then laid siege to the city for ten years and at length, by treachery, when the Greeks obtained entrance to the city in the interior of a huge wooden horse which was presented as a gift, succeeded in entering, sacking and burning it. The story of the war is told in many classic epics, notably Homer's *Iliad*.

Trolley. See **Electric Traction**.

Farm (1862); *Can You Forgive Her?* (1864); *The Last Chronicle of Barset* (1867); *The Eustace Diamonds* (1873); *The American Senator* (1877).



Leon Trotsky.

Trolls, in the traditional and semi-historical literature of Scandinavia, a species of mythical dwarfs, who were eventually regarded as demons or semi-demons. They

had abnormal thieving propensities and were often spiteful and mischievous.

Trombone, a musical instrument, the most important of the trumpet family. It is constructed of sections of brass tube so connected that they form two long loops, the three tubes of which lie parallel to one another. By means of a transverse bar, the player, while holding the mouth-piece against his lips with one hand, can at will increase the normal length of the column of air to nearly double the length of the original loop.

Tropics, the term geographically applied to the regions of the globe lying between the two parallels of latitude which mark the north and south limit of the sun's verticality to the earth's surface, namely, the Tropic of Cancer, nearly $23\frac{1}{2}^{\circ}$ n., and the Tropic of Capricorn, nearly $23\frac{1}{2}^{\circ}$ s. of the equator.

Trotsky, Leon (1879-1940). Russian Communist leader whose real name was LEV DAVIDOVICH BRONSTEIN, was born in Elisavetgrad, South Russia. For his revolutionary activities he was arrested, imprisoned, and later exiled to Ust-Kut, a village in Siberia. In 1902 he escaped from Ust-Kut and went on various missions to spread socialist propaganda. In 1917 he went to the United States, where he attempted to prevent the entrance of that country into the War. He returned to Russia after the Revolution, was an important figure in the Brest-Litovsk peace negotiations, was elected president of the Petrograd Soviet and became commander-in-chief of the Red Army. After the death of Lenin in 1923 a plan to discredit him with the Communists was put in force and he lost his position as Commissar of War. When Lenin lay dying he warned of a possible split between Trotsky and Stalin, then the Soviet's coming man. The duel between the two was clean-cut. Trotsky believed the new Russia should be the spearhead of the world revolution which was to bring the working class to power. Stalin, more the realist, perhaps, saw Europe slowly reorganizing from the post-war chaos, felt that the saner policy would be to complete the workers' revolution on the home front.

This was heresy to the Communist zealot who had built the Soviet army into a force which he believed could withstand any assault by the nationalisms at Russia's west. While Stalin welded the new state, made commercial friendships around the world, put the Soviet Union into the League of Nations—and suffered the German left revolution to collapse before Hitler—embittered

Trotsky lived on Prinkipo Island in the Sea of Marmora, an exile once more, writing *My Life* (1929). Subsequently he took refuge in France and later in Mexico where he was assassinated, 1940.

Trotting, a form of horse racing practised in various parts of the world, but which has its greatest vogue in the United States. The trotter is a typical American animal, although on one side he traces back to the Norfolk, England, trotter, to which the hackney also traces; but his development to the record of 1.56 $\frac{3}{4}$ for the mile from the three-minute horse of the early part of the nineteenth century is purely American. The history of the trotter may be said to date from the years after the War of the Revolution with the importation of the English thoroughbred stallion Messenger in 1788. The first trotting record noted was 3.00, in 1818, and not until 1845 is the first 2.30 trotter recorded. In 1938 Greyhound made the world's record of 1.55 $\frac{1}{4}$ for a mile. The Kentucky Futurity was won in 1931 by Protector in 2.01 $\frac{1}{2}$, 1.59 $\frac{1}{4}$, the fastest two-heat trotting race on record.

Troubadours, the medieval poets of southern France who flourished from the beginning of the 12th to the end of the 14th century, court poets, singers of war and of love, whose wandering lives, full of passion and adventure, have made them the typical romantic figures of their age.

Trout, a species of fish belonging to the salmon family (Salmonidae). There are more than 30 recognized species, native and introduced, in American waters which may be divided into the two groups, the Charms and the Salmon trouts. In point of size the lake trout exceeds all others of the trout family, authentic records giving a maximum weight of 123 pounds. The fish is commercially of great value, the annual yield in the Great Lakes being estimated at over 12,000,000 pounds. The brook trout, or speckled trout, is the most beautiful, active, and widely distributed of the American trout family. The weight varies usually in proportion to the abundance of the natural food supply and to the size of the body of water in which the fish is found. In most sections they seldom exceed 10 pounds, though fish weighing 10 pounds have been caught in Maine.

Trowbridge, John (1843-1923), American physicist, was born in Boston. In 1880-81 he was professor of physics in Harvard, and from 1888 until his death Rumford professor of applied science in that institution. In 1887-



Harry S. Truman.

TREES OF THE UNITED STATES AND POSSESSIONS



BLACK OAK
(*Quercus velutina*)



LIVE OAK
(*Quercus virginiana*)



WHITE ASH
(*Fraxinus americana*)



WHITE OAK
(*Quercus alba*)



PECAN
(*Carya pecan*)



AMERICAN BASSWOOD (Liriodendron
(*Liriodendron tulipifera*)



AMERICAN ELM
(*Ulmus americana*)



RED MAPLE
(*Acer rubrum*)



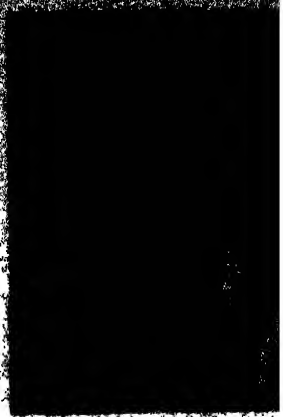
WHITE BIRCH
(*Betula papyrifera*)



SABLE CYPRESS
(*Taxodium distichum*)



AMERICAN ELM
(*Ulmus americana*)



SYCAMORE
(*Platanus occidentalis*)



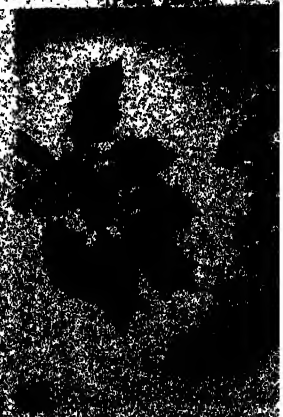
BALDCYPRESS
(*Millingtonia*)



DOUGLAS FIR
(*Pseudotsuga mucronata*)



WHITE BIRCH
(*Betula papyrifera*)



8 he spectroscopically demonstrated the presence of carbon and platinum in the atmosphere of the sun. He invented numerous electrical instruments and appliances for demonstrating physical problems.

Trowbridge, John Townsend (1827-1916), American author, was born in Ogden, Monroe County, N. Y. He was managing editor of *Our Young Folks* from 1870 to 1873. He will be remembered as one of the most popular American writers for boys.

Troy, the name usually employed to denote both the country (Troas or Troas) and the chief city (Ilios, Ilion, or Ilium) of the people known as Trojans, situated in the northwestern corner of Asia Minor. 'The tale of Troy divine,' which forms the background of the *Iliad* of Homer, is that Paris (Alexander), son of Priam, king of Troy, carried off Helen, wife of Menelaus, king of Sparta; that the Achæan princes, under the command of Menelaus' brother, Agamemnon, king of Mycenæ, undertook to recover Helen; that the Achæans, having besieged Troy for nine years, eventually sacked the city and recovered Helen. A half century ago this tale was usually regarded as mere legend; that it now ranks once more as history, in its main outlines at least, is due to the work of Heinrich Schliemann, who explored (1870 to 1890) the site of the ancient city, and of his successor Dörpfeld (1893 and 1894).

Troy, city, New York, county seat of Rensselaer co., on the e. bank of the Hudson River; 7 m. n. of Albany. Noteworthy buildings and institutions are the Rensselaer Polytechnic Institute, founded in 1824, and the Russell Sage School of Practical Arts, founded in 1916. The settlement, Van der Heyden, was in 1789 named Troy; p. 72,311.

Troyes, town, France, capital of Department of Aube, stands on the left bank of Seine, 104 m. s.e. of Paris. It has a fine Gothic cathedral and several other churches rich in Renaissance stained glass. The Musée, the only surviving relic of the famous abbey of St. Lupus, contains the public library and a collection of sculptures and paintings. The town has large hosiery mfrs.; p. 58,321.

Troyes, Chrestien de. See **Chrétien**.

Troyon, Constant (1810-65), French animal painter, was born in Sèvres, and began his art career as painter on china there. He is a master in landscape, and in the portraiture of cattle in relation to their environment. His *Holland Cattle and Landscape* is in Metropolitan Museum of Art, N. Y.

Troy Weight. See **Weights and Meas.**

Truce, in warfare, is a suspension of arms for a stated period between opposing armies, by agreement between the commanders, for the purpose of burying the dead after battle, exchange of prisoners, or negotiations. The conditions of truce have been more particularly determined by The Hague Conference.

Truce of God. See **God's Truce**.

Trudeau, Edward Livingston (1848-1915), American physician, specialist in tuberculosis, was born in New York City. He was graduated from the College of Physicians and Surgeons in 1871. In 1884 he built the first cottage of what later became the Adirondack Cottage Sanitarium, generally known now as the Trudeau Sanitarium, for incipient tuberculosis, and in 1894 founded the Saranac Laboratory for the study of tuberculosis, the first of its kind in the United States.

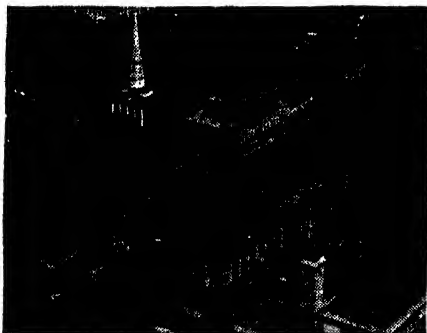
Truffles, underground fungi belonging to the division of the Ascomycetes. They have much the same appearance as potatoes, but their structure is entirely different.

Trujillo, or **Truxillo**, city, Peru, capital of the department of Libertad; 320 m. n.w. of Lima. It is an ancient Chimu city; has extensive ruins of ancient Chimu population. It is the seat of a cathedral, a superior court and a university; p. 30,000.

Truman, Harry S. (1884-), 33rd Pres. of the U. S., b. Lamar, Mo. Was graduated from high school; student, night courses, Kansas City School of Law 1923-25. In World War I, Capt. Battery D, 129th Field Artillery. After the war he opened a haberdashery in Kansas City. When business failed, with aid of Thomas J. Pendergast was appointed overseer of Jackson County highways; the following year elected judge in Jackson County. Defeated in elections of 1924, but in 1926 won out and became presiding judge. In 1934 elected U. S. Senator from Mo. Re-elected in 1940, though the campaign was affected by the overthrow of Pendergast. In 1941 Sen. Truman proposed and became chairman of a U. S. Senate Committee to Investigate the War Program. Elected Vice Pres. 1944, he served Jan. 20 to April 12, 1945, when he became Pres. following the sudden death of F. D. Roosevelt; elected pres. 1948(-52). He married a schoolmate Bess Wallace; they have one daughter, Margaret. Home, Independence, Mo.

Trumbull, John (1756-1843), American historical and portrait painter, born at Lebanon, Conn. He painted portraits of French officers for his *Surrender of Cornwallis* (1781) while on a visit to Jefferson in Paris, and also

began his famous *Declaration of Independence*. Among his noted portraits are those of Washington, Clinton, Hamilton, and Jay in the New York city hall. For several years before his death he was president of the New York Academy of Fine Arts. The Metropolitan Museum of Art has his *Alexander Hamilton*.



Scene in Troy, N. Y.

Trumbull, Jonathan (1710-85), American patriot, born at Lebanon, Conn. He was twenty-three times elected governor's assistant (1740-1766); and was deputy governor in 1766-69 and governor in 1769-83. His administration embraced the entire period of



Jonathan Trumbull (1710-85).

the Revolutionary War, and it may safely be said that Trumbull rendered more efficient service to the patriot cause than any state executive, his efforts to keep Washington supplied with troops being untiring. Tradition says that Washington's habit of calling him 'Brother Jonathan' gave rise to the phrase which was later used to designate the United States.

Trumpet, the earliest known form of

brass wind instrument. The modern orchestral trumpet consists of a tube about 5 ft. 6 in. long, curved twice to form three lengths. The lower 15 in. widen into a bell; the rest of the tube is cylindrical, and is surmounted by a cupped mouthpiece. By the use of movable sections, termed crooks, the tube can be lengthened to about 8 ft., each change of crook causing a corresponding change in the key of the instrument.

Trumpet-flower. See *Tecoma*.

Truss. (1.) In surgery, an apparatus employed in the treatment of hernia or rupture, consisting of a cushion or pad held in place by an elastic spring or bandage. (2.) In engineering, a structural framework of timbers or girders for the support of bridges, roofs, etc.

Trust (Legal). A trust is an obligation assumed by or imposed upon, a person or corporation, called the trustee, who becomes thereby bound to deal with the property over which he is given control for the benefit of one or more persons, known as the beneficiaries. A trustee may not make any personal profit from his trust estate; if he has power of sale and reinvestment, he is limited to certain securities ordinarily considered safe, as bonds secured by mortgage, municipal bonds, etc., and often prescribed by statute. He must keep accurate books of account; he must keep the funds invested; he must render an account to the beneficiaries at proper times, or file one in court, when ordered, or within a time prescribed by statute. He cannot delegate his powers. The beneficiary may apply to the court for the removal of the trustee for breach of trust, incompetency, or dishonesty.

Trust Company, a corporation empowered by its charter to receive and execute trusts. It is the general tendency of legislation in the United States to endow the trust company, in the exercise of its proper functions, with all the powers of the individual trustee. The powers of trust companies have gradually been so standardized under the incorporation laws of the States that a trust company may be defined as a bank which has the power to act in the capacity of trustee, administrator, guardian, or executor. Trust companies have become, in essence, not a distinct class of banking institutions, but simply State banks with additional powers. The leading reason for the rapid growth of trust companies in recent years has been that the incorporators desired to combine trust business with their banking business. This gives a

great advantage, especially in the larger cities.

It has been generally felt that the laws for the regulation of trust companies in nearly all the States have been too liberal for safety. As the trust companies became largely engaged in practically the same business as the banks, it came to be regarded as unfair to the latter that they should be required to keep a certain proportion of their funds idle, while the former retained in their vaults only an insignificant amount of idle cash—seldom 3 per cent. of their deposits. Another cause of complaint against the trust companies has been their prominence in connection with the financing of industrial consolidations. The underwriting of securities, the value of which has not been tested in the market, is commonly held to be of too speculative a nature to be engaged in by institutions which are entrusted by the public with funds for secure investment. The Federal Banking Act of 1933 provided for the safer and more effective use of the assets of banks, the regulation of inter-bank control, and the prevention of undue diversion of funds into speculative operations, through the organization known as the Federal Deposit Insurance Corporation.

Trusts. The term 'Trust' is used to designate a variety of forms of business organization, the common feature of which is combination and unitary control of a number of establishments that are adaptable to independent ownership and operation—usually, a majority of those producing a given commodity or performing a given service. There are five different forms in which trusts have been organized:

(1) **Agreements or Pools**, while the oldest of these forms, is of relatively small importance today. The pool is a voluntary agreement among sellers, who place the marketing of the product under central control or some general restriction. This form of agreement was alleged to exist among the five great packing companies popularly known as the Beef Trust.

(2) **The Trust Proper** had its origin in the form of organization adopted in the United States in 1882 to unify the interests of competing producers of mineral oil. The stockholders of the corporations which were parties to the agreement placed their shares of stock in the hands of trustees, receiving in exchange trust certificates. The trustees received irrevocable power of voting the stocks placed in their hands, and were therefore able to control absolutely the policy of every corporation party to the agreement.

(3) **Community of Interest.**—Unity of control, which is the aim of trusts under whatever form of organization, may also be secured through community of interest on the part of those shareholders in control of an industry. If the shares in a number of companies which are nominally competitors are so distributed that the holders of a majority interest in one are holders of a majority interest in every other, the various companies will necessarily work in harmony. Examples of this control have been the American Beet Sugar Manufacturing Company operating in the West; and the Standard Oil Company over the component parts of its organization.

(4) **The Holding Corporation** has been the most popular trust form, especially since 1899. In 1893 the State of New Jersey legalized the formation of industrial corporations one of whose purposes is to hold the securities of other corporations, and thereby created vast possibilities. Since then, most of the combinations seeking to control an industry have secured charters under the laws of New Jersey or of other States granting similar latitude of corporate action. By 1912 only two States specifically prohibited holding companies.

(5) **The Merger or Amalgamation** into a Single Corporation involves an actual exchange of the securities of the constituent companies for those of the absorbing concern. This form prevailed in the nineties, before the holding company form developed, and it received further impetus in 1904, when the Northern Securities Decision seemed to endanger the holding company.

Leading causes for the formation of Trusts are: (1) The general trend toward big business units, largely due to the growth of the factory system; (2) the desire to avoid the heavy costs of severe competition; and (3) the economies in cost of production derived from consolidation. Among the financial advantages of the trust are: (1) Improved negotiability of its securities. (2) Actual control of huge capital. Through consolidation prices are usually made more stable, perhaps raised, and general economies effected, which greatly swell the net income from the various plants forming the trust. This increased earning power is reflected in a future increase in the margin between the selling prices of the aggregate securities of the trust and of the component companies. From this margin are derived the rewards of the promoter and the underwriter, as well as the inducement that

may be offered to the principal independent producers to participate in the formation of the trust.

The over-capitalization of trusts has been one of the chief causes of popular hostility, for it is commonly believed that the necessity of earning dividends on an inflated capitalization leads to monopoly prices. Probably a more correct view of the situation is that the trust will in any case charge such prices as will yield the largest profits, the possibility of new competitors being taken into account, and this whether the capitalization is inflated or not. Enormous dividends may indeed point to the existence of monopoly profits, and it may be an advantage to a trust to conceal these. If the stock is watered, the public soon forgets the fact, and regards the moderate dividends on nominal capital as an indication of the absence of monopoly.

In other cases, a large capitalization is a constant spur to managers to make large gains, and may lead to unreasonable charges. Especially is this true when a large part of the capitalization of a trust is in the form of bonds. The managers of the trust may be forced to adopt a policy of high prices, even to the ultimate disadvantage of the trust, as the only alternative to bankruptcy. From the point of view of the public, therefore, the form of capitalization as well as its volume is significant.

To what extent the trusts have succeeded in establishing a higher scale of prices is difficult of determination. The weight of evidence indicates that even where the margin between the price of finished products and the cost of raw materials in a trust-controlled industry has remained undiminished, prices are little, if any, higher than they would have been under competition.

Regulation of Trusts.—The early trusts were organized at a time when popular excitement had been aroused by the monopolistic practices of the combinations among American transportation lines known as pools. The organizers of trusts were accordingly forced to keep their operations as secret as possible. In 1887-8 a number of the State legislatures undertook investigations to ascertain how far combinations in restraint of trade existed, and what measures were necessary for their control.

Sherman Anti-Trust Act.—In 1890 a Federal law was passed by Congress entitled, 'An act to protect trade and commerce against unlawful restraints and monopolies,' which is familiarly known as the Sherman

Anti-Trust Act. Section 1 of the Act reads: 'Every contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce among the several States, or with foreign nations, is hereby declared to be illegal. In 1939 the Dept. of Justice proceeded against several building trades unions for alleged violation of the Act. Although labor unions bitterly criticised the move, it was generally acknowledged that in many instances labor leaders had conspired in restraint of trade, esp. in the building industries.

Section 2 declares the same penalties against 'every person who shall monopolize or attempt to monopolize, or combine or conspire with any other person or persons to monopolize, any part of the trade or commerce among the several States, or with foreign nations.' The Act further provides that any person injured by such combination in restraint of inter-State trade may recover threefold damages, with costs. Under the provisions of the Sherman Anti-Trust Law a number of important suits have been brought for decision before the U. S. Federal Courts.

In the famous Northern Securities Case, decided in 1903, the U. S. Supreme Court held that the Federal Government has the power to dissolve a corporation formed to hold the stocks of various establishments in an industry, and operating in restraint of inter-State commerce. In 1905 the Supreme Court declared that a combination of about sixty per cent. of the meat packers of the company was able to control prices, and said combination was declared illegal under the Sherman Act.

Elkins Act.—Another means of trust control is the Elkins Act of 1903, intended to prevent unjust discrimination in railway charges. By the provisions of this Act the corporation giving the rebate, its agents or officers offering the same, and the recipients thereof are guilty of a misdemeanor punishable by a fine ranging from \$1,000 to \$20,000 for each offence. Under this Act, many suits have been successfully prosecuted by the Government. The most drastic fine ever imposed for rebating was that of \$29,240,000 assessed by Judge K. M. Landis, of the U. S. district court, on the Standard Oil Company of Indiana in 1907. On appeal, however, the decision of the lower court was reversed (1908) by the U. S. Court of Appeals, and the fine remitted.

Federal Trade Commission.—By act of Congress approved Sept. 26, 1914, a non-

partisan Federal commission was created, which is directed to 'prevent persons, partnerships, or corporations, excepting banks and common carriers subject to the acts to regulate commerce, from using unfair methods of competition in commerce.' To carry out the provisions of the Act, the Federal Trade Commission, composed of five members appointed by the President, is empowered to conduct hearings in any city of the United States.

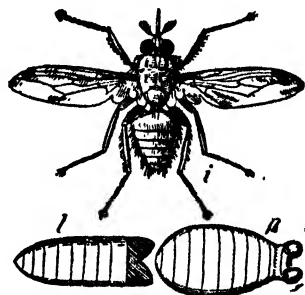
Clayton Anti-Trust Act.—The Clayton Law was approved Oct. 15, 1914. The provisions of the Law that apply to trusts may be summarized as follows: It shall be unlawful for any person to discriminate in price between different purchasers of commodities, except where such discrimination merely allows for differences in quality, in quantity sold, or in selling and transportation costs, or is made in good faith to meet competition (sec. 2). It shall be unlawful for any person to make any leases or sales on condition that the purchaser may not use or deal in the goods of competitors (sec. 3). No corporation shall acquire the whole or part of the stock or other share capital of any other corporation 'where the effect of such acquisition may be to substantially lessen competition' between the two corporations, 'or to restrain such commerce in any section or community,' or tend to create a monopoly. A decree rendered against the defendant in a suit brought by the United States under the anti-trust laws shall be *prima facie* evidence in any suit brought by any other party against the defendant; and the statute of limitations shall not run against any private right of action under the anti-trust laws during the pendency of a Federal suit under these laws based in whole or in part upon any matter essential to the private suit (sec. 5). Whenever a corporation violates any of the penal provisions of the anti-trust laws, such violation shall be deemed to be that of the individual directors, officers, or agents who have authorized or done the violating acts.

An extensive list of works relating to the Trusts, with 640 authors cited, was prepared by the Library of Congress in 1913, under the title, *List of Publications on Trusts*. Consult R. T. Ely's *Monopolies and Trusts*; *Reports of the U. S. Bureau of Corporations on the Beef Industry* (1905), *Petroleum Industry* (1906, 1907), *Tobacco Industry* (1909, 1911), *Steel Industry* (1911, 1912, 1913); Tarbell, *The Nationalizing of Business* (1936); Berge, *Cariels* (1944).

Tsar, or Czar, a Slav title meaning 'emperor,' and cognate with the Latin 'Cæsar.' It was used by the Grand Duke Vladimir of Russia early in the 12th century, and definitely adopted as the title of the reigning sovereign by Ivan the Terrible in 1547. The corresponding title of the empress was Tsaritsa or Czarina; of the heir to the throne, Tsarevitch or Czarevitch; and of the Tsar's daughters, Tsarevna.

Tschaikovsky, Peter Ilitch (1840-93), Russian musical composer, was born in Votkinsk, Viatka. He studied under Zaremba and Rubenstein, from 1866 to 1878 was professor of harmony and composition at Moscow, and subsequently devoted himself to composition. His orchestration abounds in gorgeous effects, and two of his symphonies—the *Pathétique* (Sixth) and the Fifth—are regarded as among the great examples of symphonic music. His operas include *Eugene Onegin* (1879), *The Maid of Orleans* (1881), *Mazepa* (1882), *The Enchantress* (1887), and *Iolanthe* (1893).

Tsetse (*Glossina*), a genus of dipterous insects, belonging to the family Muscidae. The various species are confined to Africa s. of the Sahara. They are bloodsuckers, and their bite is fatal to certain domesticated animals, notably the horse, ox, and dog.



Tsetse Fly.

l, larva; p, pupa; i, imago.

Tsinanfu, or **Tsinan**, or **Chinan-Fu**, (which see), city, China, capital of Shantung province. The city is built at the ft. of a range of hills. Points of interest are the Confucian Library, the museum of the English Baptist Mission, the Union Medical College, and the 'Hill of the Thousand Buddahs' just outside the city. The chief industries are the manufacture of silk brocades and trade in precious stones. Tsinanfu was the first Chinese city voluntarily opened (1906) to foreign settlement. The Tsingtao - Tsinanfu

Railway, built on land leased to Germany from 1898-1915, then taken over by Japan, has been since that time a source of difficulty between China and Japan, although Japan by the Shantung Treaty (1922) surrendered Tsingtao to China. Japanese troops were dispatched here in 1928 when Nationalist armies were moving northward in China; p.621,-039.



Peter I. Tschaikovsky.

Tsing (Ta-ts'ing or Ching) Dynasty, the name of the dynasty established by the Manchus in China in 1644. The last emperor of the Ming dynasty, harassed by the Tartars, invited the aid of the Manchus, who ultimately made themselves masters of the country. See CHINA.

Tsingtao. See Kiao-chou.

Tsou-hsien, or Tsowhsien, city, China, in the province of Shantung. The chief point of interest is the temple to Mencius, the sage whom the Chinese honor next to Confucius.

Tsushima, a strait between Korea and Japan, 100 m. wide, divided near the center by an island of the same name. Here the Russian fleet, under Admiral Rozhdestvensky, was completely destroyed by Admiral Togo in the Russo-Japanese War of 1904-05.

Tuamotu Islands, or the Low Archipelago, a group of islands in the South Pacific, comprising some 78 atolls and a few detached islands. They consist of coral belts enclosing a central lagoon. The islands are under French control.

Tuber, a thickened fleshy or scaly portion of an underground stem, which serves as a store-house or depository for starch or other plant food. Tubers generally have buds, or eyes, from which new plants are produced. Potatoes and Jerusalem artichokes are examples.

Tuberculosis, a chronic infectious and

communicable disease due to the presence of a specific micro-organism, the tubercle bacillus. The disease may manifest itself in any part of the body, but most commonly occurs in the lungs, throat, intestines, meninges (coverings of brain and spinal cord), skin, bones and joints. The present article deals chiefly with pulmonary tuberculosis. The tubercle bacillus, known also from the name of its discoverer as the Koch bacillus, is a short, narrow, slightly curved, rod-like organism, containing a high percentage of fatty and waxy substances. Exposure to moist heat at 60° c. completely destroys their virulence in an hour, and at 65° c. in fifteen minutes.

Various theories of the method of human infection with the tubercle bacillus have been propounded. Two predominant sources of vehicles of tuberculous infection are recognized, in comparison with which all other possible sources are insignificant. These are human sputum and cow's milk. Two main portals of entry are also recognized, the mouth and the nose. A vast number of persons carry tubercle without ever suffering illness therefrom. Clinical symptoms are due either to the absorption of focal products, which produces the constitutional evidences of the disease, or to the local irritating or destructive effect of the tuberculous lesion, which causes focal



Tubercle bacilli (900 times enlarged).

symptoms—cough, expectoration, hemoptysis, etc. Factors contributing to the development of tuberculous disease are intercurrent infections, especially of the respiratory tract, prolonged or intense physical strain, pregnancy and lactation, emotional stress, improper housing, inadequate clothing, underfeeding, and other faulty conditions of life.

The first essential in the treatment of the tuberculous patient is the adoption of a mode of life which will aid in developing the nat-

ural defensive mechanism of the body and rendering the soil unfavorable to the spread of infection. The effect of open air upon the toxic symptoms of tuberculosis, such as fever, night sweats, poor appetite and digestion and

ison Square Presbyterian Church in New York. He was professor at Andover Theological Seminary from 1879 to 1893 and was president of Dartmouth College from 1893 to 1909.



Darwin Tulips.

upon the cough is often remarkable. Favorable climate is now looked upon as an important aid in treatment, but not as an essential to success. The main advantage of a dry sunny climate is that it greatly facilitates out-of-door life, and insures comparative freedom from secondary respiratory infections which may exercise an adverse influence on the primary infection. Tuberculosis is the most widely distributed of all diseases. See TUBERCULOSIS ASSOCIATION, NATIONAL.

Tuberculosis, Bovine. See **Cattle.**

Tuberculosis Association, National, an association in the United States, formed in 1904, for the purpose of the study and prevention of tuberculosis. At the time of the formation of the Association the tuberculosis death rate in the United States was 202 per 100,000 population. In 1939 the death rate of pulmonary tuberculosis, which causes 90 per cent. of deaths of all forms of the disease, was reduced to 44.6 per 100,000 population.

Tuckahoe, a name given to the underground fungus, *Pachyma cocos*, which is without starch and mainly composed of pectose. It is widely distributed over the southern portion of the United States.

Tucker, William Jewett (1839-1926), American educator, was born in Griswold, Conn. He became pastor in 1875 of the Mad-

Tucson, chief city of Arizona, county seat of Pima County, situated at an altitude of nearly 2,400 ft., on the Santa Cruz River. It is the seat of the University of Arizona, State Agricultural College, School of Mines, St. Joseph's Academy. Among the features of interest are the 'Old Town' with its quaint Mexican adobe buildings and Spanish population, the Roman Catholic cathedral, the Desert Botanical Laboratory of the Carnegie Institution of Washington, old San Xavier Mission (said to be the oldest building in America), U. S. Magnetic Observatory, and Arizona Experiment Station. It is the seat of a Roman Catholic archbishopric; p. 45,254.

Tucumán, province, in the northern part of Republic of Argentina, n.w. of Santiago del Estero; area, 10,422 sq. m. Because of its fine grazing lands and fertile farm lands it is called the garden of the republic, and though small is the most densely populated of all the provinces. The manufacture of alcohol is carried on on a large scale. Other products are beans, linseed, and fruit. The Vale of Tafi is noted for the manufacture of Tafi cheese; p. 440,772.

Tucumán, city, Republic of Argentina,



Rembrandt Tulips.

capital of Tucumán province, on the Dulce River and on several important railroads connecting it with the chief cities of the republic. It is the center of the sugar producing region of Argentina; p. 91,216.

Tudor, the surname of an English dynasty (1485-1603), founded by a Welsh nobleman who married (1423) Catherine, widow of Henry v. He was the father of Edmund, Earl of Richmond. Edmund married Margaret, heiress of John Beaufort. Their son, Henry vii., reigned from 1485 to 1509. The other Tudor sovereigns were Henry viii. (1509-47), Edward vi. (1547-53), Mary (1553-58), and Elizabeth (1558-1603).

Tudor, Mary. See **Mary I.**

Tudor, William (1779-1830), American merchant and author, was born in Boston. He began the publication of the *North American Review* in 1815. He was a founder of the Boston Athenæum (1807) and was the originator of the plan to preserve the site and erect the column of the Bunker Hill Monument.

Tudor Style, a design much in vogue between 1485 and 1600, was characterized in house building by long, low structures built about a central court, with steep gabled roofs, mullioned bay windows, long galleries, and profuse interior carving, especially in the balustrades.

Tufts College, an institution of higher learning, located partly in Somerville and Medford, near Boston, and partly in Boston, Mass. It was chartered in 1852 and named for Charles Tufts, an early benefactor. Women were first admitted to the college in 1892.

Tugwell, Rexford Guy (1891-), economist, was born in Sinclairville, N. Y. and graduated from the Wharton School of Finance and Commerce, University of Pennsylvania, where he received the A.M. degree in 1916 and Ph.D., 1922. He was instructor and associate professor in economics at Columbia University, 1920-1931, professor from 1931. In 1933 he was made assistant secretary of the U. S. Department of Agriculture; in 1934, under-secretary of Agriculture. He has written *Industry's Coming of Age* (1927); *The Industrial Discipline* (1933); *The Battle for Democracy* (1934). As an adviser of President Roosevelt he has been credited with advocating and introducing many economic features of the New Deal. He was assigned direction of the rural settlement phase of the work relief program in 1935 but resigned in 1936. He was governor of Puerto Rico in 1941-42.

Tuileries, former imperial palace in Paris, the erection of which was begun by Catherine de' Medici in 1564 and completed by Louis xiv. It suffered severely at the hands

of the mob in 1792, 1830, 1848, and 1871, being burned in the last-mentioned year. In 1883 it was removed, except two wings connecting with the Louvre. The garden of the Tuileries covers an area of about 75 acres and is beautifully laid out.

Tula, city, Central Russia, is situated on both sides of the Upa River. It has a kremlin of the sixteenth century. Industrial establishments include iron foundries, locksmith shops, sugar refineries, tanneries, and tallow works. A trade in corn and hemp is carried on; p. 152,677.

Tulane University of Louisiana, a non-sectarian institution of learning in New Orleans, La., was originally organized as the Medical College of Louisiana in 1834. In 1845 the State Constitution established the University of Louisiana. In 1882 Paul Tulane donated his property in New Orleans for educational purposes to a Board of Administrators, who organized themselves as the Tulane Educational Fund.

Tulip, a genus of hardy bulbous plants belonging to the order Liliaceae, of which there are more than 80 species. Tulips usually bear showy, erect flowers with a bell-shaped perianth of six distinct segments destitute of nectaries, a sessile three-lobed stigma, and a three-celled capsule. The common tulip (*T. Gesneriana*), from which most common garden tulips are derived, is a native of Asia Minor. A great number of varieties of tulips are cultivated by florists, who usually divide them into three classes, known technically as roses, bybloemens, and bizarres. Clusius, a German who grew tulips on a large scale, was responsible for their popularity in Holland in the seventeenth century which has continued until the present day, the Dutch gardeners still being the leading producers of tulip bulbs.

Tulip Tree (*Liriodendron tulipifera*), a hardy North American tree, belonging to the order Magnoliaceae, found in woods from Rhode Island to Southern Vermont, Michigan and Missouri and south to Florida, Alabama, and Mississippi.

Tulsa, city, Oklahoma, Tulsa co., on the Arkansas River. It is the center of the vast petroleum industry of the State, and is situated in a region producing grain, dairy products, live stock and poultry; p. 142,157.

Tumble Bug, the name given to several species of beetles (order *Coleoptera*) of the scarab family. They are rounded in form,

and vary in color from the common black to a rich copper and green. The male and female tumble bugs together roll to the desired place, the ball of dung which, buried in the earth, becomes the source of nourishment for the larvae. The most famous of the tumble bugs is the sacred beetle of the Egyptians. See SCARAB.

Tumor, a swelling caused by some form of new growth arising from pre-existing tissue, and independent of the needs of the organism. It follows its own laws of growth and has no typical termination. The cause of tumor formation is still unknown. A tumor is not formed for the purpose of repair and it is not the result of any recognized organism. Certain contributory causes are, however, well recognized: Age—the liability to cancer increases with age; sex—malignant disease is commoner in the female; local irritation—seen in cancer of the lip, ‘smoker’s cancer’; mechanical injury—a history of injury is often found in tumor of the breast. Tumors fall into one of five groups—connective-tissue, muscle-tissue, nerve-tissue, vascular-tissue, and epithelial-tissue tumors.

Tun, a large cask for holding liquids, especially wine, ale, or beer. A tun is also a measure of capacity, equivalent to 252 wine gallons.

Tuna, a fish. See **Tunny**.

Tunbridge (correctly *Ton-Bridge*), residential town, England, Kent, on the Medway River; has a technical institute and a free library. It is noted for its wooden (mosaic) Tunbridge ware; p. 15,929.

Tunbridge Wells, **Royal**, watering-place, England, Kent. The springs (chalybeate) were discovered in the reign of James I., and in the 18th century were much frequented. The Pantiles is a fine promenade. Articles made of Tunbridge ware have a large sale; p. 35,568.

Tundra, the cold desert area in the extreme north of Siberia, Russia, and Alaska. Frozen for most of the year, the surface soil is thawed in the long summer days, transforming the tundra into an almost impassable marsh, infested with mosquitoes. Bones of the mammoth and other extinct animals are frequently found beneath the surface of ice and frozen soil.

Tungchow, city, China, province Chi-li, on the Pei-ho River, the terminus of through boat carriage to Peiping (15 m. distant). It is connected by rail with Peiping, Hankow, Shanghai, Canton, and other cities, and with Europe via Manchuria. The North China

Union College is situated here; p. 252,996.

Tungkwan, customs station, China; province Shensi; on the Yellow River, below the junction of the Wei. It is a garrison town and a place of great strategical importance, through which passes the main route to Central Asia; p. 38,746.

Tungsten, W (atomic weight 184.0), occurs in the form of its trioxide or acid anhydride (WO_3) mainly in wolframite, hübnerite, and scheelite; also in cuproscheelite, eelite, stolzite, ferberite, peinitz, powellite, raspite, megabasite, etc. From the trioxide (WO_3) tungsten is prepared by fusion with calcium carbonate and copper chloride, and the subsequent decomposition of the product with an acid. The reduction gives globules of tungsten 96 per cent. pure. Tungsten fused in a vacuum is gray, hard, and metallic (m.p. 2,800 c.). The specific gravity of the crystalline metal is 17.6 to 18.3, and of the powdered metal 19.2. Its malleability depends on the heat treatment it has previously received. Tungsten is non-magnetic. Heated in air, it shows bands of color as does steel. Tungsten forms alloys with iron and manganese. To steel it imparts hardness and increases its magnetic power and permanency. It combines with fluorine at ordinary temperatures, with chlorine at 250° to 300° c., and with carbon, silicon, and bismuth only at the high temperatures of the electric furnace, yielding very hard, crystalline compounds. In the United States ores of tungsten occur principally in Arizona, Nevada, Utah, and California.

Tungsten Lamps, electric lamps in which tungsten is used for the filaments. See ELECTRIC LAMPS.

Tunguragua, volcano, Ecuador. It is in the southern part of the province, is one of the most noted peaks of the Andes, and is celebrated for violent eruptions. Height, 16,690 ft.

Tunguses, a Mongolo-Tartar people of Eastern Siberia, scattered in small groups between the Yenisei River and the Pacific Ocean.

Tunic, a garment of the ancient Romans, practically identical with the Greek *chiton*. It was an under-garment of woolen material, originally sleeveless, but usually having short sleeves. It was worn by both sexes; a man’s tunic reached to a little above his knees and was girded about the loins; while a woman’s came down to her feet, and was fastened just beneath her breast. Over the tunic some loose outer drapery was usually worn, as

the Greek *pallium* or Roman *toga*. The poorer classes, however, as a rule, wore tunics only.

Tuning Fork, a small percussion instrument of definite and permanent pitch, which is used to indicate the correct pitch—according to the standard adopted—of some particular note in the musical scale.

Tunisia, a French protectorate, North Africa, bounded by the Mediterranean on the n. and e., Algeria on the w., and the great desert of the Sahara and Libya on the s. The total area is 50,000 sq.m. The interior may be divided into four regions—the Tell, central table-land, Sahel, and the Sahara. The Tell and the Sahel are fertile regions. The Sahara, or desert region, in the s., has sparse vegetation and few water-courses. Italy, after swallowing Ethiopia, 1936, and Albania, 1939, turned its attention to Tunisia demanding that France cede it. Several times in 1938 and 1939 it appeared that Italy was ready to go to war to get it. However, the Italian demands quieted down after the opening of World War II in 1939. Agriculture is the chief industry of Tunisia, more than two-thirds of the total area of the country being suitable for cultivation. The chief products are dates, wheat, barley, oats, corn, cotton, fruit, olives in the south, and the vine in the north. Forests of arbor vitae, oak, elm, ash, and cork cover about 1,235,500 acres. The fisheries are especially productive. The mineral resources include galena, zinc, salt, phosphates, lead, iron, and copper. Tunisia was one of the major battle fronts of World War II; p. 2,608,313.

Tunis, city, capital of Tunis, on the gulf of the same name. A shallow, land-locked lagoon separates it from the sea, but a canal cut through it insures access to the city for ocean-going vessels. In the city are the Mohammedan National University, an agricultural school, Pasteur Institute, cathedral, the palace of the French resident-general, several hospitals and libraries, and Belvedere Park. Tunis is an important center of trade, exporting olive oil, cereals, cattle and hides, ores, dates, morocco, fezes and gems. It has manufactures of silk and woolen textiles, pottery, and leather; p. 220,000.

Tunnels and Tunnelling. Modern tunnelling is an outgrowth of the age of steam and the resulting era of intensive industry. The 19th and 20th centuries have seen a tremendous growth in the number and mileage of tunnels built, to which the invention of the power-operated rock drill (1849)

and of dynamite (1867) have largely contributed. There are two main methods by which tunnels are built: (1) underground excavation in a generally horizontal direction without disturbing the surface; (2) excavation from the surface in a generally vertical direction, the surface being restored to its original condition by refilling over and around the tunnel. The first method may be used to pierce a mountain as well as to pass under a waterway. Such tunnels are true tunnels. In 1879 compressed air was first actually applied to tunnel work, when it was simultaneously used at New York and at Antwerp. Some notable tunnels are the following:

The Holland Vehicular Highway, two tunnels under the Hudson River, New York, 1922-26, total length each tunnel 13,740 ft.

Hoosac, through Hoosac Mt., Mass., 1876, length 25,081 ft., the first great railroad tunnel in the U. S. A.

Simplon, in the Alps, Switzerland-Italy, 1906, double track 1921, 12½ m., the longest railroad tunnel in the world.

Transandine, between Valparaiso and Buenos Aires, 1910, 5 m., with an average height of 10,486 ft. above sea level.

Tunney, James J. (Gene) (1898-), pugilist, was born in New York City; while in service with the U. S. Marines, in World War I, won the heavy-weight championship of the A. E. F. In 1926 he defeated Jack Dempsey and became heavy-weight champion, retaining the title the following year against Dempsey. He retired from boxing in 1928. In 1941 he was appointed lieutenant commander of the U. S. N. R. to direct the athletic and physical fitness program of the U. S. Navy.

Tunny (*Thynnus thynnus*), a fish belonging to the mackerel family, sometimes attaining a length of 10 ft. and a weight of 1,500 lbs. Tunnies run in schools ranging from the s. of England to Tasmania, and are very abundant in the Mediterranean, especially off Spain and Italy. The flesh is red, and it is largely salted and otherwise preserved. It is known on the Atlantic coast as the great horse-mackerel, and as tuna on the coast of California, where it is important both as a game and food fish. It is usually harpooned on the surface of the water.

Turanian, a term applied in early ethnological writings collectively to the Turki peoples of Central Asia.

Turbines, Hydraulic. See **Hydraulic Machinery**.

Turbines, Steam. The earliest form of steam engine recorded was the aeolipile, described by Hero of Alexandria in the year 120 B.C. It is generally represented as in Fig. 1. In principle it was a crude form of steam turbine, and consisted of a hollow sphere mounted on two trunnions or pivots.

In 1883 the Swedish engineer, Dr. G. De Laval brought out the first practical machine—an 'impulse' type with a single disc carrying parallel-flow, curved-face blades, or buckets, on its edges (Fig. 3). Steam enters the turbine at high pressure and at a comparatively low velocity; in passing through

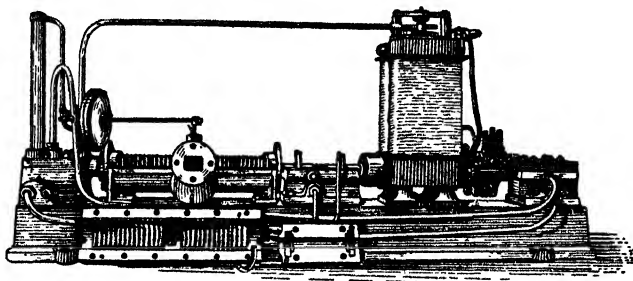


Fig. 4.

Steam was supplied through one of the trunnions, and escaped through two short pipes fixed on opposite sides of the sphere and at right angles to the axis of rotation. The ends of the pipes were bent at right angles to the plane containing the pipes and the trunnions, and pointed in opposite directions. The sphere was made to rotate by the reaction

nozzles into the turbine casing the steam pressure is lowered and as this increases the volume of a unit mass of steam, the steam velocity is increased. Most of the potential energy is converted into kinetic, or velocity energy and this stream of high velocity steam is projected upon the buckets at a slight

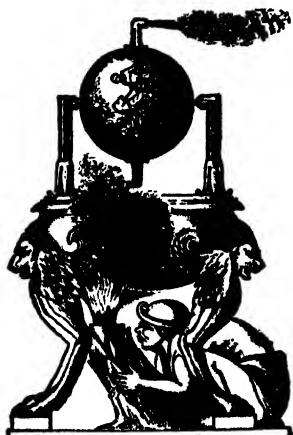


Fig. 1.

of the steam as it escaped tangentially from the ends of the bent pipes. The next historic device is that of Giovanni de Branca, an Italian, who in 1629 constructed a horizontal paddle wheel on whose vanes a steam jet impinged (Fig. 2).

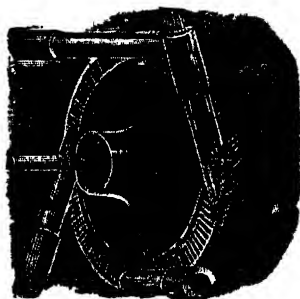


Fig. 3.

angle with the plane of the disc, finally rebounding from the buckets into the exhaust chamber on the other side of the disc.

In 1884, at Gateshead-on-Tyne, C. A. Parsons built a machine in which the 'reaction' idea was the foundation. Steam was blown through a series of fixed and rotating blades. The rotating blades were fastened in rows to a drum, and the fixed ones projected inward from the walls of the cylinder as shown in Fig. 4. The passages through the blades were of constantly increasing volume, giving velocity to the steam for impact

on entrance to the blades, and allowing it to develop a reactive thrust on leaving.

The first machine built on the patents of Charles G. Curtis was completed in 1901 by the General Electric Company. Since then the number of machines has rapidly multiplied. The Curtis machine is very largely an 'impulse' type, though a small and unimportant reaction function may be pictured.

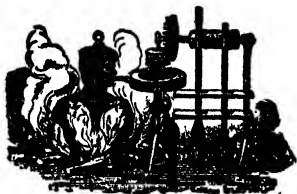


Fig. 2.

This turbine is like the De Laval in as far as it expands the steam in nozzles and causes it to impinge on moving blades or buckets. There are two important differences, however (see Fig. 5): (1) the impact of the steam is successively on moving and guide vanes until most of its velocity is gone; (2) the full expansion of the steam is not completed in a single nozzle (or row of parallel nozzles), but in several stages, the velocity being reduced between expansions.

From the foregoing outline of the development of steam-turbine types, it is seen that the passage of the steam across the face of buckets or blades fastened onto a wheel or drum causes rotation. Steam of comparatively low velocity, but under pressure, when allowed to expand to a lower pressure, has greater volume and higher velocity in the direction of expansion. The temperature is lowered as the stored heat energy is thus converted into kinetic energy. The energy released may be recovered as mechanical work (1) by receiving the impact of a jet of the rapidly moving steam on obstructions, like the buckets of a De Laval wheel, (2) by permitting the expansion in passages on a wheel which is made to revolve by the backward 'kick' of the escaping steam, or (3) by combining these two effects. The first modification of the simple turbine in order to secure lower speed is to convert the heat energy of the steam to kinetic energy in several stages, instead of at once. In the reaction type this would mean several rows of fixed and rotating blades, with their passages arranged to permit gradual expansion of the steam all along its path. In the impulse type

the steam might be expanded to minimum pressure and maximum velocity in a single row of parallel nozzles, and caused to flow across alternate rows of moving buckets and fixed guide blades, rebounding from one to the other until its velocity was sufficiently reduced.

Turbine Developments Since 1920.—The World War I brought to light the necessity of cheap power. In answer to the demand of the central stations, the largest purchasers of turbines, the builders began to give closer attention to the redesign of details of the machines to give better efficiencies. As a result the coal used per kilowatt hour showed a marked decrease until 1926, after which the decrease was less marked. There is a tendency toward larger capacities at the higher speeds. Large units are being compounded, using two or more cylinders either in tandem on the same shaft with one generator.

A recent demand for cross-compound turbines has served to focus attention on this type of prime mover, a Westinghouse unit being shown in Fig. 6. The expansion cycle is here carried out in two or more turbine elements driving separate generators, and sometimes operating at different synchronous speeds.

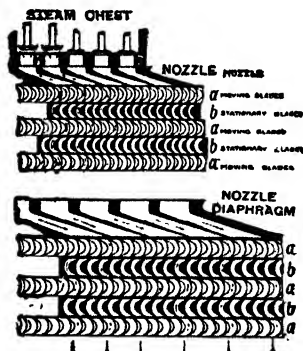


Fig. 5.

The Mercury Turbine.—Improvement in thermal economy in any heat-power process demands an extension of the range of temperature of the working substance. On the lower end the minimum temperature is fixed by the temperature of the available supply of condenser cooling water. The upper limit of the temperature range is determined by the ability of metal structures, such as valves, superheaters and high-pressure turbine casings, to withstand the direct effects of high temperature and to retain sufficient

strength at high temperature to withstand the stresses resulting from the pressures employed. Superheated steam at moderate pressures has the disadvantage that most of the heat is received by the steam at temperatures well below the maximum. To secure the greatest gain possible, it is necessary to go beyond the use of steam alone, and for that purpose the mercury vapor process has been developed to the point of successful technical operation. The process now in operation at the Hartford Electric Light Co. generates mercury vapor at 70 lb. per sq. in. gauge and a temperature of 884° F. This passes through a three-stage turbine that exhausts at a pressure of 1 lb. per sq. in. absolute and at a temperature of 450° F., into a tubular heat exchanger, which is at once the mercury condenser and the steam boiler. Steam is generated in this boiler at a pressure of 350 lb. per sq. in. gauge, at a temperature of 436° F. and is then superheated by the flue gas from the mercury boiler and passes into the steam header of an ordinary steam-turbine plant.

The temperature of the saturated mercury vapor is about 300° F. higher than that of saturated steam at the highest pressures now used in this country; saturated steam at 580 F. develops a pressure of 1,350 lb. per sq. in. absolute. The energy available from the mercury vapor is 60 per cent. greater than that from superheated steam at such pressures, for the same quantity of fuel burned under the boiler. In effect, the mercury is used to convey heat from the furnace to the steam boiler, and incidentally it passes through a turbine and develops useful power. If a steam plant were fully equipped with mercury turbines, its capacity would be increased about 75 per cent., and there would be no fuel-fired steam boilers. Consult Church's *Steam Turbines* (1928); Terril Croft's *Steam Turbines* (1925).

Turbot, a member of the Pleuronectidae, or flatfish family, distinguished by having the eyes on the left side, a broad, somewhat diamond-shaped body, the absence of scales, and the presence of scattered bony tubercles. It is found in moderately deep and shallow water throughout the Mediterranean, Black, and North Seas, becoming rarer in the N.; and is one of the best of European food fishes.

Turgeneff (Turgenieff), Ivan Sergoievitch (1818-83), Russian novelist, was born at Orel. He was educated at the Universities of Moscow, St. Petersburg, and Berlin. He

first made himself widely known by his *Annals of a Sportsman*, in which he exposed the wrongs of the serfs. Some utterances in 1852, displeasing to the Czar, caused him to be confined to the bounds of his estate till 1855. He then took up his residence abroad, mostly at Baden-Baden and Paris. For forty years he was an intimate friend of Madame Viardot, a well-known opera singer, whose husband, Louis Viardot, translated several of his novels into French. Turgeneff ranks as the greatest prose artist in the history of Russian letters. His influence on modern literature has been profound, especially in France. In his *Nest of Nobles* (1858) and in *Helene* (1860) translated as *On the Eve*, he gives a vivid picture of dreamy and enthusiastic Russia in love with her ideals and ever theorizing. In *Fathers and Sons* (1861), *Smoke* (1867), and *Virgin Soil* (1876), he shows those Slavophile ideas which had so great an effect on Russian thought. Like almost all Russian writers, Turgeneff is often depressed. In all his stories is an atmosphere of hopeless melancholy, made more impressive by his serene insight and sanity. His *Novels* were translated into English by Constance Garnett (14 vols., 1894-97). Consult Turner's *Modern Novelists of Russia*; Lloyd's *Two Russian Reformers: Ivan Turgeneff and Leo Tolstoy*.

Turgot, Anne Robert Jacques, Baron de l'Aulne (1727-81), French statesman, was born in Paris. As intendant of Limoges (1761-74) he reformed the system of collecting taxes, and tried to stimulate agriculture and manufactures, helping to establish the celebrated Limoges porcelain industry. Soon after the accession of Louis XVI. Turgot, as controller-general of finance, attempted to introduce in the nation reforms similar to those accomplished in Limoges. In spite of the opposition of the Parliament and the nobles, he re-established the freedom of the corn trade in the interior of the kingdom, modified the system of tax adjusting and tax collecting, removed the disabilities of foreigners, and relieved the small farmers and manufacturers.

Turin (*Augusta Taurinorum*: Italian *Torino*), city, capital of province of Turin, Piedmont, Italy, on the River Po. Among the older buildings are the Palazzo Carignano (now a natural history museum), the 15th century Gothic cathedral, and the royal palace; the modern include the Mole Antonelliana (containing the Risorgimento Italiano Museum). Picture galleries and mu-

seums are numerous and contain valuable collections. The university was founded in 1405.

Turin is an important railway center, and is the nearest city to the Mont Cenis tunnel. Silk, grown extensively in the adjacent country, paper, cotton, linen, and leather are manufactured. Turin became a Roman colony under the Emperor Augustus. During the 16th and 17th centuries it was alternately under France and Savoy. It was the capital of the kingdom of Sardinia till 1860 when it became the capital of Italy, remaining so till 1865; p. 629,000.



Ivan Sergeievitch Turgenieff.

Turkestan, a township of U. S. S. R. Central Asia, in the Kazakh Republic, on the Orenburg-Tashkend Railway. The tomb of Hazret-Yassavi is a celebrated place for Moslem pilgrimages. There is also a historic citadel in the township. The people carry on trade in wool and hides.

Turkestan, Chinese, the s. part of Sinkiang province, China, lies between the Tian Shan Mountains n.w. and n. and the Kuenlun Mountains and Tibet s., Area, 550,340 sq. m.; p. 1,200,000.

It is constituted almost entirely of the elevated basin of the Tarlin (4,600 ft.), which terminates in the marshes of the great inland lake of Lob Nor (2,675 ft.). East of Lob Nor stretches the desert of Gobi. The population is in the main Turkish. The inhabitants dwell mostly in the w. and in chains of towns and villages in the oases along the northern edge of the desert. Large numbers of live stock are raised and wool and hides exported. The traffic is almost

entirely by caravans of camels or asses, and the trade is mainly in carpets, silks, and felts. The chief towns are Yarkand, Khotan, and Kashgar.

This region was taken by China in 1758. Dr. Sven Hedin and Dr. Stein have discovered evidences of ruined cities and an ancient civilization going back to the fourth or third century B.C. See Hedin's *The Wandering Lake*.

Turkestan, Russian, or Western, a name applied to the provinces of Syr Daria, Samarkand, Fergana, Semirychensk, and Transcaspiia, now called Soviet Central Asia. Russian Turkestan had an area of 623,651 sq. m. and a population of about 5,500,000. It comprised all Asia between the Caspian, the Tarbagatai Mountains, the Tian Shan, e. and s. of the Pamir and the northern frontier of Afghanistan and Iran (except only for Bokhara and Khiva). In 1924-1925 there were created from Turkestan, Khiva, and Bokhara by a re-distribution according to former nationality of the population, three new republics, Turkmen S. S. R., Tajikistan and Uzbek S. S. R. Some parts of Turkestan which were chiefly inhabited by Kirghiz became part of Kazak S. S. R.; others were later formed into Kirghiz S. S. R. The mineral wealth is considerable. The population consists of four principal groups—(1) Turkish, (2) Iranian, (3) Russian, (4) other immigrants. The first, the most important, consists of Uzbeks, Kirghiz, Turcomans, and Kara-Kalpaks. The South Aryan or Iranian population (Tajiks, Sarts, and Persians) numbers about 1,000,000; the North Aryan or Slavonic (Russians, etc.) about 100,000.



Turkey.

Turkey (*Meleagris*), a genus of American game-birds, including only two species. The domesticated form is derived from *M. gallinapavo*, which in the wild state ranges from the s. of Canada to Mexico, through the

Eastern and Southwestern States. The head and neck are reddish in color, nearly bare of feathers, and covered with a wrinkled, warty skin. The head bears a pendent erectile process, and the male has a strong spur, as well as a peculiar bunch of black bristles on the chest. The plumage generally is bronze, with a metallic sheen and black markings. The tail in the male is capable of being erected, and the bird at the same time utters a gobbling cry.

Turkey is a republic, consisting of the Anatolian peninsula and the southern portion of the Balkan Peninsula. The Ottoman Empire, which the Nationalist Government of Turkey has superseded, no longer exists, having lost more than half of its territory in the decade from 1910 to 1920. Tripoli-in-Africa went to Italy by the Treaty of Lausanne in October, 1912; Albania, Macedonia, a large part of Thrace, and the Aegean Islands became independent or were taken by Greece, Serbia, Montenegro, and Bulgaria after the two Balkan Wars of 1912-1913; while World War I resulted in the entire loss of Egypt and Cyprus (nominally under Turkish sovereignty in 1914) and the inevitable separation from the Empire of Syria, Mesopotamia, and the Arabian Peninsula. The present territory consists of (1) Istanbul and Eastern Thrace; (2) the whole of Asia Minor; (3) Imbros, Tenedos, and Rabbit Islands. The total area is 296,503 sq. m., of which 9,257 are in Europe. The population is 22,949,000, that of the capital, Ankara (former Angora), 295,000; of Istanbul (Constantinople), 1,018,468.

Topography and Climate.—But little is left to Turkey in Europe. Outside of Istanbul (Constantinople) the only two cities are Adrianople or Edirne, and Rodosto. This region includes the famous Gallipoli Peninsula. Along the Sea of Marmora the climate is mild, but the northern and eastern portions, especially along the Black Sea coast, have cold winters and considerable snowfall.

Asia Minor, with Armenia and Kurdistan, forms a high plateau, broken by numerous mountain ridges and streams, and possessing many broad and fertile plains, known as *ovvas*. Along the sea coast the climate is everywhere mild, but inland in the higher altitudes the winters are severe, with heavy snowfall, especially in the central and eastern sections. Lake Van is the only lake upon which there is any considerable navigation, and none of the rivers are navigable except near their mouths. The Taurus range has

much beautiful scenery. Central and Eastern Asia Minor and Armenia are almost entirely treeless and the erosion is consequently very rapid.

Of the older industries, the making of carpets and rugs has best adapted itself to modern industrial conditions. Nearly every house in the interior has its loom for carpets or the weaving of cotton and woolen cloth. Pottery is made at the Dardanelles and Kutahia; inlaid work at Afion Karahissar, etc., and other simple crafts are carried on in the regions less accessible to imported goods. The fisheries along the Bosphorus at Constantinople are the most important.

Until 1922 the Turkish Empire was a theocratic limited monarchy under the Sultan or Padishah, who was also Caliph or successor of the Prophet. During the summer of 1919 a Nationalist Party was formed under the leadership of Mustapha Kemal Pasha, upon a program of self-determination for Turkey as expressed in the famous 'National Pact.' This new party won a sweeping victory in the parliamentary election of 1919-1920, but the Allied armies of occupation thereupon banished to Malta many of its most conspicuous members. In April, 1920, Mustapha Kemal Pasha gathered around him the remaining Nationalist members of Parliament, and organized the Grand National Assembly at Angora. This assembly repudiated the Constantinople government and denounced the Treaty of Sèvres.

The government of the Grand National Assembly, by virtue of a series of brilliant military victories, terminating with the capture of Smyrna from the Turks in September, 1922, became the *de jure* as well as the *de facto* government of Turkey. On Nov. 1, 1922, the Sultanate was abolished and the caliphate divorced from the civil power. It was not until Oct. 27, 1923, however, that Turkey was formally proclaimed a republic, with Mustapha Kemal as first pres. For a more detailed account see *History* below.

During World War I the Turkish military forces played an important part in campaigns at Gallipoli, in Mesopotamia, the Caucasus, and Palestine. Turkey had in all nearly two million men enrolled. Casualties were enormous, not only because of the severity of the military campaigns, but because of losses due to poor sanitation and hospital care, epidemics of typhus, cholera, typhoid, and dysentery. In spite of the complete surrender of the Turkish armies by the Mudania Armistice of 1918, the Nationalists succeeded

in welding a powerful force, variously estimated at from 150,000 to 300,000, with which they drove the French from Cilicia and the Greeks from Smyrna, during the years 1921 and 1922.

History.—The Turks first appear in European history in the middle of the 14th century. Driven by the Mongols from Central Asia to Armenia, and extending their domain gradually westward into Asia Minor, they derived their name of Osmanlis (corrupted to Ottomans) from the first Sultan Osman (1258-1326), whose son Orkhan (1326-59) made his capital at Brusa, opposite Constantinople. Orkhan's son Solymán captured (1358) Gallipoli, whereby the Turks first gained a footing in Europe. Murad I. or Amurath (1359-89) established the capital of his empire at Adrianople, reduced the Byzantine empire to the narrow limits of Constantinople, and defeated the Serbians and their allies at the great battle of Kosovo, or the Field of Blackbirds (June 15, 1389). With the capture of Constantinople (May 29, 1453), however, by Mohammed II. (1451-81), the fate of the Balkan peninsula was sealed, and Hungary herself was saved only by the crowning exploit of Hunyadi, the defense of Belgrade (1456), and the subsequent firm and judicious policy of his son, Matthias I. It was under Solymán or Suleiman II. (1520-66) that the Osmanli empire reached its utmost limits and became a terror to Christendom. In 1521 he captured Belgrade, the key of Hungary; Rhodes fell in 1522; and two years later the central portions of Hungary became a Turkish province. The first check to Ottoman aggression was received beneath the walls of Vienna in 1529. On the other hand, the Sultan won possession of Algeria and the north coast of Africa to the east, and made himself master of the Mediterranean, being successfully resisted only at Malta by the Knights of St. John.

The decline of the empire was everywhere visible under the three feeble Sultans, Murad II. (d. 1595), Mohammed III. (d. 1603), and Ahmed I. (d. 1617). With Mohammed IV. (1648-87) a more glorious era began, but their only territorial acquisitions were Crete, Podolia, and part of the Ukraine. Vienna was vainly besieged a second time, in 1683; and after a ruinous war with the emperor, Mustapha II. (1695-1703) was obliged to conclude the humiliating Peace of Carlowitz, whereby the Porte relinquished all Hungary except the Banat.

The next century and a half were marked

by frequent gains and losses for the Turkish Empire in its wars with Balkan states and against the advances of Russia. The Turkish fleet was destroyed at Navarino (1827), and victorious Russians advanced as far as Adrianople, where (Sept. 14, 1829) peace was concluded, whereby the special privileges of Serbia and the Danubian principalities and the complete independence of Greece were recognized by the Porte. The endeavors of the sultan to strengthen his empire by a more rigorous centralization only ended in the loss of Egypt, and on the accession of his son Abdul Medjid (1839-61) the empire was saved from Mehemet Ali of Egypt only by the armed intervention of the Western powers. The Treaty of London (1841) closed the Bosphorus and the Dardanelles against ships of war.

Abdul Hamid II. became Sultan in 1876, and England proposed a conference for the purpose of providing for the administrative autonomy of the Balkan provinces, while preserving the integrity of the Ottoman empire. But Russia declared war against the Porte (April 24, 1877). The Turks were forced at last to yield to numbers and submit to the Peace of San Stefano (March 3, 1878), whereby they recognized the absolute independence of Rumania and Serbia, consented to the aggrandizement of Serbia and Montenegro, to the erection of an autonomous Bulgaria, and ceded the Dobrudja. The energetic intervention of England, however, led to the Peace Congress of the powers at Berlin (1878), for the purpose of regulating the whole Eastern question. The Congress limited autonomous Bulgaria to the North Balkan district, the southern portion of the land being erected into a province (East Roumelia) under Turkish suzerainty. Austria was at the same time authorized to occupy Bosnia and Herzegovina, despite the protests of the Porte; and Greece also was allowed advantageously to rectify her frontiers. Great Britain occupied the Island of Cyprus, for the supposed purpose of assisting in the defense of Turkey against future Russian aggression. For the next ten years the Porte adhered to a pacific policy. In 1897, however, when Greece provoked the Turks to open war, Edhem Pasha easily defeated the Greeks, and in a few weeks' time occupied the whole of Thessaly; and Greece was saved only by the intervention of the Powers (Peace of Constantinople, Dec. 4, 1897). One of the greatest political events in the modern history of Turkey occurred in

1908, when, after a peaceful revolution led by the Young Turk party, a general amnesty was proclaimed, the constitution was restored, the assembling of a chamber of deputies was ordered, a reform cabinet was inducted into office, and constitutional government was inaugurated by the opening of a parliament (Dec. 17). While they did not succeed in holding their power, this marks the beginning of the new Turkey. The Turco-Italian War, begun over Tripoli, lasted from Sept., 1911, to Oct., 1912. Then Turkey, harassed by uprisings in Albania, and by the general dissatisfaction with the Young Turk régime, agreed to the proposed terms of peace; and the Treaty of Lausanne was signed at Ouchy, Switzerland, on Oct. '8, 1912.

One of the principal reasons for the success of the Turkish revolution in July, 1908, was the fear of many Turks that unless steps were taken to clear up the situation in Macedonia, the Great Powers would take a hand and Turkey would be deprived of control over much of its territory in Europe. The Young Turks unfortunately proved unequal to the task of effecting the required reforms, and the grievances of Bulgaria, Greece, and Serbia increased in volume and bitterness. In March, 1912, under the leadership of Venizelos, the eminent Greek statesman, the Balkan states seized upon the crisis in Turkish affairs caused by the war with Italy to form a coalition against the common enemy. On October 13, 1912, the Bulgarian, Greek and Serbian governments sent an identical note to Turkey, demanding complete autonomy for Macedonia. War was declared on October 17, by Turkey against Bulgaria and Serbia, while Greece declared war on Turkey the following day. With her enemies uniformly successful in the month that followed, Turkey began negotiations with the Bulgarians for an armistice on November 13, 1912. A conference at London led to the signing of a treaty on May 30th, 1913, by which Crete and the islands were lost to Turkey, as well as all of Macedonia and Thrace west of a line from Enos on the Aegean coast to Midia on the Black Sea. When the Second Balkan War began on July 5, 1913, the Turkish leaders at once advanced on Bulgaria and recaptured Adrianople. This partial success greatly cheered the Turkish nation, and great efforts were made to reform the army and increase the navy. But World War I intervened, and Turkey was soon found to be against the

Allies. The Dardanelles were closed by the Turks at the end of September, 1914. War was declared by the Allies in November. For an account of Turkish activities, see **WORLD WAR I** and **DARDANELLES**.

Italy recalled her Ambassador on Aug. 20, 1915, and entered the war against Turkey. Turkey declared war on Rumania on August 30, 1916. After the entry of the United States into the war Turkey severed diplomatic relations with that country on April 20, 1917, American interest in Turkey being placed under the protection of the Swedish legation at Constantinople. The Young Turk leaders early in 1915 determined upon a policy of deportation of all the Armenian population of the country except in the cities of Constantinople and Smyrna. The same measure of deportation was applied to the Greek population of the Black Sea, Aegean, and Marmora littorals. The Chaldeans or Assyrians in Southeastern Asia Minor also suffered severely, while thousands of Syrians were exiled from Syria and Palestine to Asia Minor.

After the collapse of Bulgaria, Turkey was soon cut off from the Central Powers, and the series of defeats in Syria and Mesopotamia showed that the military strength of the country was broken. A delegation was sent to ask for an armistice, which was granted on October 29, 1918. The first allied officers landed at Constantinople on November 8th, and the main Allied fleets arrived on the 13th. The negotiations of the peace with Turkey were postponed until the end of the conference. Many calls were made upon the United States to assume a mandate for all or portions of the Turkish Empire, and especially for Armenia. On June 1, 1920, however, the Senate of the United States refused to sanction any such intervention in the Near East. Private and individual American philanthropy, on the other hand, did more than any other agency to relieve suffering and bring about healthy reconstruction. The Near East Relief was given a special charter by Congress to carry on this work, and it expended tens of millions of dollars for the relief and rehabilitation of the distressed peoples of the Near East.

On May 15, 1919, in accordance with a decision of the Peace Conference at Paris, a Greek army of occupation was landed at Smyrna, in anticipation of the eventual award of the city to Greece when peace should be signed. During the summer of 1919 a group of patriotic Turks, under the leader-

ship of Mustapha Kemal Pasha, a distinguished Turkish general, met to determine upon a course of action to save Turkey from the dismemberment which the Greek occupation of Smyrna seemed to presage. They determined to reject any treaty which would hand over Turkish populations to foreign domination, reduce Turkey to economic servitude to the Allies, or impair the sovereignty of their country. In Constantinople, Jan. 28, 1920, the Nationalist members of the Turkish Parliament signed a National Pact, which has frequently been referred to as a Declaration of Independence of the New Turkey. The Pact was a declaration of principles and a program of action. It announced the renunciation of the non-Turkish provinces of the former Ottoman Empire, but served notice that Cilicia, Mosul, and the Turkish portions of Thrace must remain under Turkish sovereignty. It declared that 'all juridical or financial restrictions of any nature,' such as the Capitulations, must be abandoned by the Western Powers.

The answer of the Inter-Allied administration at Constantinople was the banishment to Malta of many of the Nationalist leaders. Mustapha Kemal was safe in the Anatolian highlands, however, and in April, 1920, the government of the Grand National Assembly was instituted in Angora. Then came the long, bitter struggle against the Greeks, terminating with the capture of Smyrna in September, 1922. On Oct. 10, 1922, all of the Allies signed the Mudania Armistice with Turkey, terminating the state of war. Under the terms of the treaty of the Peace of Lausanne the western boundary of Turkey in Europe was set at the Maritza River, and the city of Adrianople was returned to Turkish sovereignty. In Asia, the Turkish Republic was recognized as consisting of the entire Anatolian peninsula, including Cilicia. The status of Mosul was left to friendly negotiation between Great Britain and Turkey. The Straits were neutralized and disarmed, commercial vessels being granted rights of passage, in peace and war, comparable to the rights of the open sea. The Capitulations were abolished. The treaty was ratified by the Grand National Assembly on August 23, 1923.

Boundary disputes growing out of the peace settlement disturbed relations between Turkey and three of its immediate neighbors—Iraq, Syria, and Greece. The League Council awarded all but a fraction of the Vilayet of Mosul to the British mandated

territory of Iraq, or Irak, December 16, 1925.

By a series of special acts the Nationalist government achieved the complete secularization of the state before the close of the year 1928. Social reforms were instituted in rapid succession so as to facilitate intercourse with Europe. Women were asked to discard their veils; in matters of divorce and inheritance they were given equal rights with men before the courts. Polygamy was made illegal. Men were forced to wear European caps and hats in place of the fez. None of these changes were compatible with strict Mohammedan tradition, and in the more conservative districts of the country caused a considerable amount of dissatisfaction, although among cultured groups of the larger cities they were greeted as logical and inevitable.

Perhaps the most difficult change introduced by Mustapha Kemal Pasha was the substitution of the Latin for the Arabic alphabet in writing the Turkish language. All adults under sixty-five years of age were required to attend classes until they could pass a literacy test. Owing to the need made evident by the census returns of 1927, all Turks were ordered to adopt family names. For police records, army registers, and tax rolls, the multiplicity of such names as Ali, Ahmet, and Mehmet created many difficulties. Mustapha Kemal was given the surname of Atatürk, or Chief Turk, by the Assembly.

In 1927 a commercial bond issue of approximately \$104,000,000 was authorized by the Grand National Assembly to facilitate railroad construction and harbor development. Rehabilitation of a country which had been at war for eleven consecutive years was of necessity a difficult and slow process. Taxes were high. The balance of trade was adverse. A treasury deficit confronted the republic in each year of its early existence. And it was contrary to the policy of the Nationalist government to borrow abroad.

Yet arrangements were made covering the foreign debt, and Turkey has continued to advance rapidly in all lines. In 1933, the tenth anniversary of the establishment of the Turkish republic, Mustapha Kemal was devoting his attention to the reorganization and encouragement of industry. This included a five-year plan for factories, announced Jan. 9, 1934; the granting of a contract for the construction of a 420-mile railway between Sivas and Erzeroum; the building of a branch line to rich copper mines in Central Anatolia; and the creation of a branch of the Ministry of National Defense

for internal aviation development. In the same year Istanbul University was completely reorganized on a modern basis, with many foreign professors; and English replaced French as the chief foreign language in the schools. Mustapha Kemal Atatürk was re-elected for the second time on March 1, 1935. On April 10, 1936, Turkey asked the powers that signed the Treaty of Lausanne for its revision to allow it to remilitarize the Straits of the Dardanelles and the Bosphorus. This change was ratified on November 8, 1936, by all except Italy. Atatürk died in 1938 and Gen. İsmet İnönü became president. World War II, 1939, caused all of the European powers to attempt to enlist the sympathies of Turkey. Despite great pressure from Germany and Russia, Turkey signed an agreement with England and France agreeing to assist the Allies to repel any German invasion of the small Balkan countries. That treaty, however, expressly provided that Turkey could not be drawn into any war against Russia.

Turkey, Literature of. The Ottoman Turks, derived their culture from the Seljuk Turks, who preceded them in Asia Minor. Turkish literature thus became a branch of Persian literature, written in the Turkish language. Sultan Velede was the first West Turkish poet. He was followed by other mystic poets or versifiers, the most noteworthy being Ashik Pasha (d. 1332). The language of these men is necessarily crude: Turkish as a written speech was still in its infancy. This period, the formative age of Ottoman literature, closes about the middle of the 15th century, when the influence of the Persianized court of Herat begins to dominate Turkish letters.

Turkish poetry of this second period is distinguished by a tendency to run into allegory, and by the extraordinary attention paid to rhetoric. The earliest poet of the new style was Ahmed Pasha (d. 1496), but he was surpassed by Nejiati (d. 1508), Mesîhi (d. 1512), and others. The school culminated in Baki (d. 1600), whose lyrics are unrivalled in ingenuity and elegance; but the truest poet was Fuzûlî (d. 1555), who is perhaps the greatest master of pathos in Turkish literature. Among the best prose works of this time are Ali Chelebi's (d. 1499) version of the *Fables of Bidpai* (Pipay) and Sad-ud-Din's (d. 1599), history of the empire entitled *Tâj-ut-Tevârîkh* (Crown of Chronicles).

With the dawn of the 17th century an-

other period begins. The models are now the Persian Urfi (d. 1590) and Faîdî (d. 1595), and the chief feature of the style fashioned on them is the substitution of eloquence for rhetoric. The greatest poet of the school is Nef'i (d. 1634). The fourth period extends from the beginning of the 18th to the middle of the 19th century. The best writer of the earlier time is the poet Nedim (d. 1730). Sheikh Ghâlib (d. 1798) is the greatest poet of this epoch; his allegory *Husn u Ashk* ('Beauty and Love') is in some respects the finest poem in the language.

However this Persian reaction produced no really great writer, and toward the middle of the century it was superseded by the new school of Turkish literature, modelled on the literature of Europe. The writer who first clearly struck the new note was Shînâsî Effendi (d. 1871). He was ably seconded by a number of talented and energetic disciples, chief among whom was Kemâl Bey (d. 1888), one of the most gifted men of letters Turkey has produced.

The appearance of this new school has introduced the fifth period of Turkish literature, the result of the study of French. Turkish poetry turns now for inspiration to Paris instead of Shiraz. Abdul-Hakk Hamid Bey is the author of many fine poems and dramas. His lead was successfully followed by Ekrem Bey. Within recent years a band of young poets, the most prominent of whom is perhaps Tewfik Fikret Bey, have moulded the Turkish language into an instrument capable of expressing or suggesting the subtlest shades of thought. Prose, too, has been quite revolutionized, Kemâl Bey leading the way.

Turkey-buzzard. See **Vulture**.

Turkey-Red. See **Alizarin** and **Dyeing**.

Turkheim, village of Alsace, France, scene of a battle Jan. 5, 1675, in which the French under the great Marshal Turenne decisively defeated the Dutch and Allies forcing them to retreat from Alsace.

Turkmanshai, vil., Azerbaijan, Iran, 64 m. e.s.e. of Tabriz. In 1828 a peace was concluded here between Persia and Russia, by which the latter acquired a great part of Armenia.

Turkmen, or **Turkoman Socialist Soviet Republic**, is one of the sixteen separate republics of the Soviet Union, covering in its territory the former Transcaspian territory of Turkestan. It was in the earlier division a province of Russian Central Asia, bounded by the Caspian Sea, Persia, Afghanistan, Bokhara, and Khiva. The

new republic includes also a vilayet of Bokhara and a small part of Khiva. The area is about 190,000 sq. m.; the population is over a million, of whom by far the greatest number are Mohammedan Turkomans. Agriculture is the chief occupation; cattle raising and rug weaving are important industries. Nearly nine-tenths of the region is, however, sandy desert with meager rainfall. The seat of government is Poltarask, which is the former Askabad. The Merv oasis in this region was the seat of a very ancient civilization, visited and developed by Alexander the Great.

Turkomans, or **Turkmenians**, a branch of the Turki race, forming the bulk of the population in Western Turkestan or Turkmenistan, and N. Iran (Khorassan, Azerbaijan). The Turkomans are usually regarded as an offshoot of the Uzbeks, who penetrated to the Caspian region in the 14th century. They are mostly nomad shepherds, and all are Mohammedans.

Turks Islands, a southeasterly group of the Bahamas, about 110 m. n. of Santo Domingo. The largest of them is called Grand Turk or Turk's Island. They contain lagoons from which salt of fine quality is obtained and exported to the U. S. and British America.

Turmeric is derived from the rhizome of various species of *Curcuma* growing in China, India, Java, Barbados.

Turner, Joseph Mallord William (1775-1851), English landscape painter, one of the greatest of the English school. Up to 1792 he painted in water-color. His *Battle of the Nile* (1799), in oil, won an election as an associate in the Royal Academy. His later works displayed a remarkable richness of color. Among them are *Bridge of Sighs*, *The Whale Ship*, *The Fighting Temeraire*, and *The Slave Ship*.

Turner, Nat (c. 1800-31), negro slave, the leader of the so-called 'Nat Turner's Insurrection' in Virginia in 1831.

Turnips, a common field and garden plant, the enlarged root of which is extensively used as a table vegetable and stock food. The turnip is a biennial and belongs to the same genus as cabbage, rape, kale, etc.

There are two species of turnip, known as *Brassica rapa* and *Brassica campestris*, which are native to Europe and Asia. The common white, flat turnip (*Brassica rapa*) has many cultivated varieties. The Swedish turnip or rutabaga (*Brassica campestris*), like the common turnip, acquires a large

fleshy root the first year and seed the second. Turnips contain about 90 per cent. water, and for stock feeding are considered about equal to corn silage. The greatest enemies to the turnip crop are the root-maggot and the flea beetle.

Turnu-Severin, town and river port, county of Mehedinți, Rumania, on the left bank of the Danube. It exports grain, salt, and petroleum. There are the remains of a bridge built by Trajan, and of a town erected by Alexander Severus. The town was occupied by Austro-German troops, Nov. 24, 1916; p. 18,337.

Turpentine, the resinous exudation of various Coniferae, that from *Pinus australis* (American turpentine), *Pinus pinaster* (French), *Pinus sylvestris* (Russian), and *Pinus larix* (Venice), being the most popular. In 1901 the U. S. Bureau of Forestry, after many experiments in obtaining crude turpentine, discovered a method not unlike that used in obtaining maple sap, which has found wide application in the Southern United States. On distillation by fire, heat or steam, the volatile 'oil' or 'spirits' of turpentine passes off, leaving colophony or resin. The volatile portion consists mainly of terpenes, having the formula $C_{10}H_{10}$. Oil of turpentine is a colorless liquid of characteristic odor. It boils at about $160^{\circ} C.$, and is a good solvent for oils and resins, being used for this purpose in the preparation of paints and varnishes, which consume about 90 per cent. of the turpentine used in the U. S. Oil of turpentine is used in medicine chiefly for external applications. The beginning of the turpentine industry on a large scale in the United States is closely associated with the discovery of the vast pine forests along the south-eastern and southern coasts from North Carolina to Texas. Turpentine substitutes are the higher fractions of petroleum and asphalt oils. Synthetic turpentine are made by the oxidation, dehydration or special distillation of one of the terpene group of chemicals.

Turpin, Tulpin, or **Tilpin** (d. c. 794), archbishop of Rheims for more than forty years. He encouraged literature, and is credited with the composition of a chronicle of Charlemagne and Roland, one of the grand sources of the tales of chivalry of the middle ages.

Turpin, Dick (1706-39), English highwayman, was born in Hempstead in Essex. The famous ride from London to York, generally attributed to Turpin, was accomplished

in all probability by another highwayman, Nevison ('Nicks'), who, having committed a robbery at Gad's Hill (Kent) at 4 A.M., appeared in York that same evening at 7.45 o'clock, thereby establishing an *alibi*. Turpin was hanged at York.

Turquoise, also known as **Callaité**, $\text{Al}(\text{OH})_3 \cdot \text{PO}_4 \cdot \text{H}_2\text{O}$, is a precious stone prized for its perfection of color, which, in the finest specimens, is a beautiful clear sky-blue. In less valuable stones there is often a greenish cast, and in some the green predominates. Turquoise is found in comparatively few places and is confined almost exclusively to barren and arid regions. The most important deposits in the world are found in Nishapur, Persia. In the United States, stones of good quality are found in New Mexico, Arizona, California, Colorado, and Nevada.

Turret, in naval architecture, a small armored tower, wholly covered in and capable of being revolved. It contains one or more guns, which project through ports in the armor. The first ship fitted with a turret was the U. S. vessel *Monitor*, built after Ericsson's plans in 1862.

Turtle. See **Tortoises and Turtles**.

Turtle-dove, common name of a genus of ground-pigeons (*Turtur*), including a number of species, of which the true turtle-dove (*T. communis*) is probably best known. This bird is abundant throughout Europe during the summer, retiring in winter to Northern Africa. In the United States the name turtle-dove is given to a widespread and numerous group, *Zenaidurae*, of which the mourning-dove (*Z. carolinensis*) is typical. This bird is migratory in the northern part of the country but is resident practically throughout the year in the South. It has a plaintive, mournful note, constantly repeated during the mating season, whence it derives its name of 'mourning-dove.'

Tuscaloosa, city, Alabama, county seat of Tuscaloosa co., on the navigable Black Warrior River. It was formerly the State capital, and is the seat of the University of Alabama, Stillman Institute for colored students (Presb.) and several other private educational institutions. There are coal and iron mines and clay pits in the surrounding district. The city is a shipping point for cotton and other agricultural products; p. 46,396.

Tuscan Order, in architecture, a modified Roman Doric, with inflated columns. See **ARCHITECTURE**.

Tuscany, a former grand duchy of Central

Italy, lying mainly south and west of the Apennines. It coincided with the provinces of Arezzo, Firenze (Florence), Grosseto, Livorno (Leghorn), Lucca, Massa and Carrara, Pisa, and Siena. The present department of Tuscany includes all the above named provinces and Pistoia. Area 8,853 sq. m. The fertile valley of the Arno is occupied by well cultivated farms; the coast district near Leghorn is marshy and malarial. The mining industry is well developed; copper is found in large quantities, and salt and iron occur. In the 12th and 13th centuries, it split up into independent republics, among which Pisa and Florence were most important. During the time of Napoleon it was under Austrian rule. In 1860 it was annexed to Sardinia, and in 1861 became part of the kingdom of Italy; p. 2,892,364.

Tuscaroras, a tribe of North American Indians, forming a southern branch of the Iroquois family, and living originally in North Carolina. In 1715 after twice making trouble they fled northward and joined the Iroquois Confederacy of Five Nations, making it thereafter Six Nations. The few survivors are now settled in New York (364) and Ontario (416).

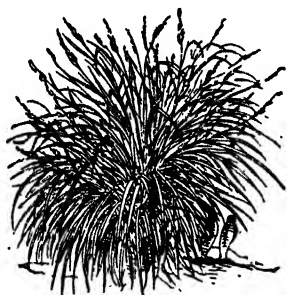
Tusculum, ancient Latin town, close to the modern Frascati, was situated on a high hill connected with the Alban Mount; 12 m. s.e. of Rome. It was reputed to have been founded by a son of Odysseus and Circe, and was certainly older than Rome. After its defeat at Lake Regillus in 497 B.C., it was a faithful ally of Rome until the Latin War of 340 B.C., when it joined the revolted Latins. From the settlement of 335 B.C., however, its history was that of Rome.

Tuskegee, town, Alabama, county seat of Macon co., on the Tuskegee River; 38 m. e. of Montgomery. It is the seat of Tuskegee Normal and Industrial Institute and the United States Veteran Hospital for Negroes. It has lumber, planing, cottonseed-oil, and grist mills, and carriage and furniture factories. It was settled in 1780; p. 6,712.

Tussac Grass, or **Tussock Grass**, a large growing hardy grass, *Festuca flabellata* or *Dactylis cespitosa*. It is of some value as a cattle food, and grows in great tufts, five or six feet high, with long, tapering leaves.

Tussock Moth, a name given to the moths of the family Liparidae. Two extremely troublesome species have been imported into America and have caused vast expense in New England, where they have become

acclimated. These are the gypsy moth and the brown-tailed (*Euproctis chrysorrhea*), which is scarcely less to be dreaded.



Tussock Grass.

1, Spicule; 2, flower.

Tut-ankh-amen, King of Egypt, twelfth ruler of the eighteenth dynasty (1581-1328 B.C.), whose tomb in the Valley of the Kings, near Luxor, Egypt, was entered Nov. 29, 1922, by an expedition of the Earl of Carnarvon, under the direction of Howard Carter, a British Egyptologist. The search for this tomb had been carried on for some years, and its discovery was greeted as 'the greatest archaeological find of the century.' Unlike the three hundred other royal tombs in the valley it seemed to have been untouched since a few years after the death of the King. Many articles, including leather couches, elaborately carved and painted boxes containing robes and jewels, chariots, funeral offerings, and palace furnishings were removed. See ARCHAEOLOGY.



Tussock Moth.

Tuticorin, seaport town and municipality, in Madras, India. It has pearl fisheries, of less importance than formerly, and cotton goods are manufactured. It exports cotton, coffee, tea and cattle; p. 40,200.

Tutuila, island of the Samoan group, with an area of 77 sq. m. It is the easternmost of the larger islands, is of volcanic origin, and has peaks of 2,326 feet and 1,469 feet. Pago-Pago, the best harbor in the islands, was ceded to the United States in 1872 as a naval station. The chief products are breadfruits, yams, cocoanuts, oranges, pineapples and bananas. Copra is exported. Tutuila was annexed by the United States in 1899, and is administered by a United States naval officer; p. about 7,000.

TVA. Tennessee Valley Authority. See **United States, New Deal**; **Tennessee R.**

TVACI. Tennessee Valley Associated Cooperatives, Inc. See **United States, New Deal**.

Tver, now called **Kalinin**, city of Soviet Russia, situated on both banks of the Upper Volga. It has an imperial palace, erected by Catherine II., with a museum of ethnology and archaeology. Sailcloth and other textiles, machinery, and leather goods are manufactured, and there are iron foundries, breweries, distilleries, and dye works; p. 216,131.

Twain, Mark. See **Clemens, Samuel L.**

Tweed, a woolen fabric, largely manufactured in Scotland, and extensively used for men's and women's informal wear.

Tweed, the principal river of Southeastern Scotland, rises at Tweedswell near the sources of the Clyde and Annan, and flows 96 m. to the sea at Berwick.

Tweed, William Marcy (1823-78), American political 'boss' of New York City, was born there. He was one of the original members of a fire engine company known as 'Big Six,' and, having gained influence as foreman of this company, entered politics. He was a member of the Board of Aldermen, national Representative, supervisor, school commissioner, and deputy street commissioner, and State senator. He was a member of the Tammany Hall organization, and in 1870, when the Department of Public Works was organized, Tweed became its head. The coterie which he formed, known as the 'Tweed Ring,' diverted to the use of its members several millions of the public funds. In November, 1873, he was convicted of embezzlement and sentenced to twelve years' imprisonment and to pay a heavy fine. He died in the Ludlow Street Jail, April 12, 1878. See **TAMMANY HALL**.

Twelfth Day, the festival of the Epiphany, being the twelfth day after Christmas, is kept as the manifestation of Christ

to the Gentiles, who were typified by the wise men of the East.

Twelve Tables, the oldest code of Roman laws, drawn up by a specially appointed committee of decemvirs in 451-449 B.C. They were engraved on twelve copper tables, and were the foundation of Roman law, both public and private.

Twickenham, residential town and district, England, Middlesex co.; on the Thames connected by bridge with Richmond; 10 m. s.w. of London. Pope, Walpole, Fielding and other celebrities were associated with it; p. 39,900.

Twillingate, or **Toulinguet**, seaport, Newfoundland, capital of the district of Twillingate and Fogo, on the two Twillingate Islands in Notre Dame Bay. It has an unprotected harbor and extensive fisheries; p. 3,348.

Tybee, is. at the mouth of Savannah river, Ga., best known as a resort. It is separated from the other coast islands by Lazaretto creek. Tybee Light, 134 ft. high and 150 ft. above the sea, visible for 18 m., is at its n.e. end.

Tyler, John (1790-1862), tenth President of the U. S., born at Greenway, Charles City co., Va., March 29, 1790. His family had been prominent from early colonial times and claimed descent from the English rebel Wat Tyler. Young Tyler graduated at William and Mary College in 1807 and was admitted to the bar in 1809. He soon entered politics, serving in the state legislature seven years; in Congress five years as representative and nine years as Senator; and as governor of Virginia. In 1836 the legislature of Virginia instructed him to vote to expunge the resolution of censure passed in 1834. He refused and resigned his seat, returning to the practice of law. At the Whig National Convention at Harrisburg, Pa., in 1839, he was nominated for vice-president on the ticket with William Henry Harrison, in order to attract the votes of the strict constructionist Democrats. The Whig ticket was elected, but Harrison died within a month after his inauguration, and Tyler succeeded to the presidency. Though his views upon public questions were well known, and though he had made no pretence of a change, he retained the cabinet of his predecessors and attempted to conciliate the party leaders. The 'National Republican' element, under the leadership of Clay, was now in control of the party caucus and was determined to establish another

Bank of the United States. The President's plan to establish a department of the exchequer had been contemptuously put aside. After conferences with Tyler a bill to establish a 'Fiscal Corporation' with certain banking powers was passed. This bill was vetoed Sept. 9, 1842. Upon the veto of the 'Fiscal Corporation' bill, the party disclaimed any further connection with him, and the cabinet resigned, with the exception of Webster, who was anxious to complete the Ashburton Treaty.

Apparently the Whigs endeavored to force him to the point where impeachment proceedings would be in order, but they were unsuccessful. Later in his term his affiliations with the Democrats increased, and J. C. Calhoun served as secretary of state in 1844-45 and concluded the negotiation of a treaty for the annexation of Texas in 1844, finally approved March 1, 1845. On the expiration of his term Tyler retired to Sherwood Forest, an estate on the James river which he had recently purchased. In 1859 he was elected chancellor of William and Mary College and served until his death, which occurred in Richmond, Jan. 17, 1862. Although Tyler's administration and general course have received much severe criticism, some of which perhaps is deserved, the charge of treachery is obviously untrue. His principles were perfectly well known at the time of his nomination and election, and, in fact, he was chosen because of those principles. His administration, however, illustrates the danger of choosing a vice-president out of sympathy with party policy for the sake of conciliating a faction or of gaining additional votes. See Tyler's *Letters and Times of the Tylers*, 3 vols. (1884-96).

Tyler, Lyon Gardiner (1853-1935), American educator, born in Sherwood Forest, Va., the son of President Tyler. In 1888 he was chosen president of William and Mary College. He wrote *Life and Times of the Tylers* (1884-85); besides many historical papers and books.

Tyler, Wat (d. 1381), English rebel. Together with Jack Straw he led the rebels in the rising of 1381, and meeting Richard II. at Smithfield, demanded that there should be no outlawry, no serfdom, and but one bishop in England. Tyler was slain by Walworth, the lord mayor.

Tympanum, in anatomy, the middle ear, or, in a restricted sense, the tympanic membrane, the drum of the ear. See EAR.

Tyndale, William (?1490-1536), English translator of the Bible and Protestant martyr was born in Gloucestershire, England. His translation of the New Testament was vigorously combated by ecclesiastical authorities in England. He was taken into custody at Antwerp, and, after fifteen months' imprisonment, was tried in 1536, and on October 6 was burned at the stake. Tyndale's original works were collected by the Parker Society (1848-50).

Tyndareus, in ancient Greek legend, was king of Sparta, and father, by Leda, of Castor and Clytemnestra.

Tyne, the principal river of Northumberland, England, is formed by the confluence of the North and South Tyne. The principal towns for which it provides an outlet to the sea are Newcastle, Gateshead, North and South Shields, Jarrow, Hebburn, Wallsend, and Walker.

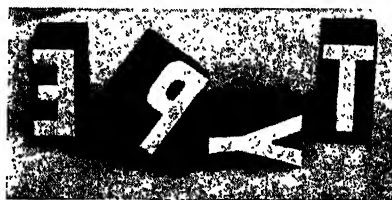
Tynemouth (including North Shields), munic. and parl. bor. and seapt., Northumberland, England, on the Tyne. There are remains of an ancient castle. The harbor is sheltered by the north and south (South Shields) piers. There are shipbuilding and industries connected with shipping; p. 64,900.

Type, in chemistry, the system of classifying together those chemical compounds that could be obtained from one another by substitution, and hence were of the same type—a theory first enunciated by Dumas. This theory did much to initiate clear conceptions of the nature of chemical compounds.

Type Metal, an alloy of somewhat variable composition, but in general consisting of 2 parts antimony and from 8 to 11 parts lead, along with 1 part or less of tin, and sometimes a little copper. It is fairly easily fusible, takes a sharp impression of the mold, and is hard enough to stand considerable wear without deterioration.

Types and Typefounding. In the early days of printing each printer made his own types by cutting out the text on wooden blocks. The next step was to cut out the letters singly on small pieces of wood or soft metal. This was early found to be an expensive and uncertain process, and soon a system was devised for casting separate types by means of moulds. The earliest notice of typefounding in Great Britain is in the Preface to the *Chronicles of King Alfred*, printed in 1567 by John Daye, which states that Daye was the first to cast Saxon types in England. In the U. S. the first attempts at

typefounding were made by Christopher Saur about 1735 at Germantown, Pa. Towards the end of the century the type foundry of Binny and Ronaldson was established at Philadelphia, and in 1813 the firm of D. and G. Bruce was started in New York City. In 1892 the American Type Founders' Co. was established and soon embraced the majority of the large American foundries. In typefounding the first operation is the cutting of the punch or die of the required letter on softened steel. The punch, when duly hard-



Type.

ened, is struck into a piece of copper by the 'justifier,' and thus produces a finished matrix, which is so trimmed and 'justified' that when placed in the mould the types cast from it will be regular in height and appearance with all the other types produced from punches of the same font. The types are subjected to a series of 'finishing' processes, such as breaking off the tag, rubbing along a prepared file to give thorough smoothness, and finally 'dressed' by being turned upside down in specially prepared blocks, when a small plane channel-cuts a groove in the feet of the types removing all unevenness and enabling them to stand properly. There are many varieties and sizes of type. In the United States type sizes are classified according to a system of points, one-twelfth part of a pica being termed a 'point.' Pica is the usual standard of measurement used by printers, and is nearly one-sixth of an inch in width; nonpareil is half pica. A complete assortment of type is called a font, to which a proportionate amount of the separate letters is given, according to frequency in use.

Typesetting Machines. It is convenient to divide typesetting machines into two classes:

(1.) *Machines setting single letters of ordinary type.*—In all the machines in this group each letter is stored in a separate magazine. The required letters are released one by one from their magazines by the operator playing on a keyboard similar to that of a

typewriter; and each letter, when released, slides or is carried into its proper vertical position in the line of matter which the operator is setting. The older machines can only set word after word continuously; the division of the matter into lines of the required length, and the 'justification' of these lines, must in their case be done by hand. The latest machines have automatic justifying devices of a very complicated nature, which perform all the work previously done by hand. The natural companion of a machine for composing single types is a machine for distributing these types for resetting. Most of the machines have distributors of an automatic kind, in which a continuous movement brings each type into its proper magazine. The letters are distinguished from one another, in such cases, by special nicks or grooves cast in the types, which exactly fit corresponding projections in the slot of the magazine.

(2.) *Type Casting and Setting Machines.*

—The machines which both cast type and set it by the operation of a keyboard are a great advance on all machines in the first group. Two of these are in very general use. The Linotype (invented by Ottmar Mergenthaler) is in general use in newspaper offices all over the world. As the name implies, the machine casts type in a line instead of single letters. The Linotype does not, strictly speaking, set type; it sets matrices (moulds) for the type. Each matrix is a flat piece of brass with the mould for the type face at one end. The matrices are distinguished from one another by wards cut in the edge, similar to the wards in a pass-key. They are stored in grooved magazines at the top of the machine, and are released by the operation of the keyboard. As the operator plays upon the keyboard the matrix of each letter falls down in its proper place in the line. Between each pair of words the depression of a space-key inserts a steel space band, constructed of two movable wedges. The completion of each line is noted by a bell, and when the last word has been set the movement of a lever drives the space wedges together, thus expanding the spaces sufficiently to justify the line. There is then in position a row of matrices representing a whole line, with equal spaces dividing the words. These are placed above a groove of the right depth and thickness, and form a mould for a complete line of type; metal is then pumped in from a melting-pot, and the line of type, in one solid block, called a 'slug,' is discharged into a galley.

Even more ingenious is the Lanston Monotype, a machine which casts and composes single types in lines of the required length, automatically justifying each line.

Typewriters, machines in which movable types are made to print letters on an adjustable sheet by striking keys in a keyboard. The first record of the typewriter is an English patent to one Henry Mill in 1714. About 1867 C. Latham Sholes, a Milwaukee printer, backed by James Densmore of Meadville, Pa., produced a machine that was so nearly complete as to be submitted to professional stenographers for experiment in writing out their notes. In 1873 Remington & Sons, gun-makers of Ilion, N. Y., took up the Sholes machine. The first machines were placed on the market in 1874 as the Remington typewriter. It is known today as the ancestor of all typewriters. The earlier machines had a key for each character, which was later simplified by putting two letters at the end of each bar.

In 1897 the typewriter was brought to its present form by the Underwood machine, in the introduction of the vertical 'basket' of type bars and front stroke, in place of the horizontal basket and understroke. Recent years have seen the production of the 'noiseless' typewriter in which the clicking sound of the type is much softened. Another recent invention is the telegraphic attachment which transmits typewriting over telegraph or telephone lines. In 1934 a new braille typewriter was made for operation by the blind. In 1936 the International Commercial Schools Contest Associations conducted a typewriting contest for the world championship. It was won by Albert Tangora of N. Y. C. who in one hour averaged 135 words a minute, tying the world record.

In 1943 a new typewriter keyboard designed to give more work to the right hand, invented by Lt. Com. August Dvorak, of Washington, D. C., promised to speed up ordinary typewriting to 180 words a minute.

Typhoid Fever (Enteric Fever), an infectious disease characterized clinically by fever, diarrhea, abdominal tenderness, a rose-colored eruption, enlargement of the spleen, and other conditions. The symptoms, however, are very inconstant, and even the fever is often atypical. The cause of the disease is a special micro-organism, the typhoid bacillus, sometimes called Eberth's bacillus. It belongs to the same general group as the colon bacillus and the dysentery and meat-poisoning organisms, but has less active fer-

mentative powers. The bacteria are taken in through the mouth and, penetrating the intestinal wall, pass through the body in the blood stream, and later colonize throughout the intestinal and mesenteric glands, as well as in the spleen, the bone marrow, and the liver. They leave the body chiefly in the stools and urine. Typhoid prevails especially in temperate climates, although widely distributed over all the world. It is a disease of youth and early adult life, the susceptibility being greatest between the ages of fifteen and twenty-five. Cases are rare in patients over sixty years of age. Persons handling the body linen or excreta of a typhoid patient are liable to direct contagion, and this is the commonest mode of transmission, except where large communities are exposed to periodical epidemics from infected drinking water. Sources of water supply, such as wells and streams, become infected from surface drainage contaminated with the dejecta of typhoid patients. Milk is another common means of spreading the disease. Oysters 'fattened' in sewage-polluted waters and uncooked vegetables grown in ground manured with sewage may communicate typhoid fever. The house fly is an important means of dissemination. One of the most important methods of control of typhoid fever lies in the use of preventive inoculation. The duration of the immunity so obtained is difficult to determine exactly. In the U. S. Army it is customary to revaccinate at the beginning of each enlistment period of four years and again whenever conditions of exposure warrant. The period of incubation is from eight to twenty-one days, during which there is more or less lassitude. The onset of the fever is gradual, being marked by chilliness, headache, nausea, and vague pains, which increase in severity till the patient is compelled to take to bed. Generally with the fourth week convalescence begins, if the patient is to recover. But there is still serious danger of a relapse. Secondary complications such as pneumonia, sometimes add to the risk.

Typhoon, a destructive cyclonic hurricane, accompanied by heavy rain, that occurs in the China Sea, most frequently during August, September, and October. It originates in the warm equatorial Pacific, southeast of Asia, and moves in westerly directions, gradually trending northward, and striking the coasts

of Japan, China, and the Philippine Islands.

Typhus Fever, an acute, specific, highly contagious disease often occurring in sharply defined epidemics. Typhoid fever was once confused with typhus fever, and when it was recognized as a different disease it was named *typh-oid* because it was like the more common and more deadly scourge. Typhus fever used also to be called '*Camp Fever*' and '*Jail Fever*,' because it raged so terribly under the unsanitary conditions which prevailed in such places. The germ of this disease is carried from person to person by the bite of the louse, and perhaps at times by other vermin. It is now very rare in the United States, because habits of personal cleanliness have generally banished the carriers of the germ from our dwellings.

Typographical Union, International, the oldest of American international trade unions, is a general association of all wage earners in the printing and allied trades. Local typographical unions had existed as early as 1795, but the first national body was organized in December, 1850 and in 1869 the present name was adopted. The union has remained a part of the A. F. of L. but has actively assisted the C. I. O.

Tyre, a famous city of antiquity, stood on the Phoenician coast, 20 m. s. of Sidon, partly on an island, partly on the mainland. For many centuries Tyre was one of the chief trading places of the ancient world, and was widely famous for its purple dyes. Alexander the Great took the island city by constructing a mole from the mainland in 332 B.C. Its prosperity ceased with the conquest of Syria by the Ottoman Turks in 1516; p. 5,000.

Tyrol, province in Austria, is noted for the beauty of its scenery, and covers an area of 10,300 sq. m. The Alps traverse the country: the Dolomites rise in the south, but the culminating point is the Ortlerspitze (12,810 ft.). The Brenner is the most famous pass. Chief town, Innsbruck.

Tyrone, county, Ulster, Ireland. The surface is mountainous or hilly in the north and south, and flat toward Lough Neagh, east. Agriculture and cattle rearing are the principal industries; linen and coarse woollens are manufactured; p. 132,800.

Tyrrhenian Sea, that part of the Mediterranean which lies between the west coast of Italy and the islands of Corsica and Sardinia to the west, and Sicily to the south

U

U

U. In Greek this vowel had a sound similar to its value in French *lune*; in Latin it was like the English sound in the word *rule*. In the seventeenth century long *u* became a diphthong, with the value of its modern name; it occurs chiefly in words of French origin (*duke*). Short *u* acquired a new value about the middle of the seventeenth century (example, *but*), but its old value also survives (*rule*). An occasional early use of *u* in place of *e* or *i* is still represented in the words *bury* and *business*. The form **U** is simply a modification of **V**. In the Greek alphabets **V** and **Y** were used alternately.

Ubangi, or **Ubanghi**, river in West Africa, forms part of the boundary between the Belgian and French Congos, and empties into the Congo River. Length, 1,500 m.

Ubangi-Shari, a colony of French Equatorial Africa; area, 238,767 sq. m.

Ubeda, a city in Spain. It has lead mines, trade in wine and oil, and manufactures cloth, soap, and leather; p. 23,000.

Ucayali, or **Ucayale**, river, Peru, a s. branch of the Amazon, rises as the Apurimac in the mountains n.w. of Lake Titicaca, and joins with the Marañon to form the main stream of the Amazon. Length, about 1,500 m.

Uchi, or **Yuchi**, a tribe of North American Indians, forming a distinct linguistic stock. They dwelt formerly in Georgia and South Carolina, along the middle Savannah River. In 1799 they were found in the Creek country, with four towns and 8,000 people. They now number about 650, and live with the Creeks on the Arkansas River, Oklahoma.

Udaipur, also called **Mewar** or **Meywar**, state in Rajputana, India, with an area of 12,861 sq. m., and a population of over 1,400,000. The capital, Udaipur, or Oodeypore, 120 m. s.e. of Jodhpur, has an imposing palace.

Udall, or **Uvedale**, **Nicholas** (1505-56), English dramatist. In 1554 he became playwright to Queen Mary. His *Ralph Roister Doister* is the earliest known English comedy (printed about 1566), and is still read.

Uganda

Udine (ancient *Vedinum*), town, capital of Udine province, Venetia, Italy; 60 m. n.e. of Venice. It has manufactures of silks, velvets, linens, cottons, and leather. On a hill in the center of the town stands the Castle, once the residence of the patriarchs of Aquileia, now used as a barracks. Other buildings are the Romanesque Cathedral, Archiepiscopal Palace, and municipal buildings; p. 52,690.

Ufa, town, capital of the Bashkir Republic, U. S. S. R., on the Belaya River. It is a river port situated in the midst of some of the most picturesque land of European Russia. Mining, lumbering, and agriculture furnish the chief industries of the section; p. 103,485.

Uganda Protectorate, a British protectorate in East Africa which forms a quadrangle at the headwaters of the Nile, between Lake Albert, Lake Edward, Lake Rudolph, and Lake Victoria. Its area is about 94,200 sq. m., including 13,616 sq. m. of water. The country is partly mountainous, partly undulating and partly a plain. The rainfall varies from 10 to 100 inches according to locality; the soil is generally fertile; and the climate on the whole is mild and uniform, although the region around Victoria Nyanza is damp and malarial and the inhabitants have suffered greatly from 'sleeping sickness.' Uganda produces granite, iron, quartz, gold, and graphite. There are magnificent forests, and the swamps are rank with papyrus, rushes, reeds, and a coarse grass which the natives use for building purposes. Rubber, cotton, coffee, acacia gum, indigo, sugar, and peanuts are grown. Telephone and telegraph lines extended over 3945 miles in 1934. The total population is about 3,553,500, over 3,000,000 of whom are natives. Of these natives about 874,000 belong to the intelligent Baganda, a people converted to Christianity by French and English missionaries. There are a few Congo pygmies. The Protectorate is under direct administration of the British except the Rudolf Province and some small districts, but native kings are encouraged to

conduct the government of their own subjects. The British representative is the Governor.

Ujjain, or **Oojein**, town, Central India, 32 m. n. of Indore. It was once the capital of Malwa and one of the seven sacred Hindu cities; p. 40,000.

Ukase, a term applied in the Russian Empire to an edict issued either by the czar or by the senate, enjoining legislative or administrative measures. Ukases formed the basis of the *swod* or imperial code.

Ukraine ('borderland'), in southwestern U. S. S. R., sometimes known as Little Russia, its official name being the Ukrainian Socialist Soviet Republic. The area is about 166,368 sq. m. More than nine-tenths of the surface consists of plains and plateaus, known as the steppes. The climate is pleasant and healthful, being transitional between the warmth of the Mediterranean and the cold of Northern Europe. The soil is exceedingly fertile. The black earth region, famous for its richness, extends longitudinally through Ukraine and embraces three-fourths of its territory, making it the richest grain country of Europe. Wine culture, silkworm breeding and bee-keeping are carried on, and large flocks of sheep, an excellent breed of horses, and good hogs are raised. Agriculture is the chief industry of the people. Coal, mercury, copper, manganese, and iron are found in great quantities. Petroleum and peat also occur. Factories are developing rapidly. There is a large hydroelectric station at Dneprostov, producing over 800,000 horsepower. The people (38,900,000) are taller, handsomer, more vivacious than the Great Russians, speak a dialect quite different from that of their northern neighbors, and profess the Orthodox Greek faith. Kiev (846,000) is the largest city. Kharkov (833,000) is the capital. Other large cities are Odessa (604,000) and Stalingrad (445,476). In 1942 the Nazis held most of the Ukraine, but in the summer of 1943 the Russians made steady progress in regaining this rich section of their country.

Ulcer, an open sore, with a discharge of a purulent character from the exposed tissues. In all ulcers the surrounding blood-vessels are dilated, and serum and corpuscles exude from the capillaries into the tissues and upon the floor of the ulcer. An important form of ulcer is that known as bed sore. In very extensive ulcers skin-grafting may be necessary.

In all ulcers the source of irritation must be removed, and the surface of the ulcer should be rendered aseptic.

Uleåborg (Oulu), seaport of Finland, capital of the government of Uleåborg, is situated at the mouth of the Uleå, on the Gulf of Bothnia. It exports timber, hides, and leather, pitch and tar; p. 23,480.

Ulfilas, Ulphilas, or **Wulfila** (c. 311-381), translator of the Bible into Gothic, was of Gothic birth. His translation (ed. Bernhard, 1875), of which portions only exist, is the oldest extant literary monument in any of the Germanic languages.

Ulm, river port and fortified town, East Württemberg, Germany, is situated on the left bank of the Danube opposite New Ulm, Bavaria. The Protestant cathedral (1377), in the Late Gothic style, is remarkable for architectural beauty, and is, next to the cathedral of Cologne, the largest church in Germany. Leading industries are the manufacture of cotton, woolen, and other textiles; p. 58,000.

Ulpian, or, in full, **Domitius Ulpianus** (fl. A.D. 220), Roman jurist, was descended from a Phœnician family. He was murdered in 228 by soldiers. Ulpian was a voluminous writer, and as a jurist he takes the first rank after Papinian.

Ulster, nine counties of northeast Ireland. Six of these comprise Northern Ireland and three of the counties are in Eire. Flax is grown for the linen manufacture, the staple industry of the northeast. There are shipyards at Belfast and many other industries. The population is largely Protestant; p. 1,279,745.

Ultramarine, a blue pigment, originally obtained by grinding up lapis lazuli, but now prepared artificially. A mixture of pure china clay, sodium carbonate, charcoal, and sulphur, with sometimes free silica in addition is heated and the product, when sorted, ground, and washed, is of fine blue color, and is permanent except when acted on by acids. Blue ultramarine is used extensively in the arts. It was formerly used also in laundry work.

Ultra-Violet Rays. See **Actinic Rays**.

Ulysses, or **Ulixes**, the Latin form of Odysseus. See **ODYSSEUS**.

Uman, town, Ukraine, U.S.S.R. It is the seat of an agricultural college, and has manufactures of tobacco, malt, candles, bricks, and vinegar, as well as tanneries, breweries, distilleries, flour mills, and iron foundries; p. about 48,000, largely Jews.

Umballa, or **Ambala**, city, capital of the district of same name, Punjab, India; p. 76, 326.

Umbel, an inflorescence, in which all the flowers are borne upon pedicels of equal length arising from a common center.

Umbelliferae, a natural order of mostly herbaceous hardy plants usually bearing umbels of small flowers with five petals, five stamens, and inferior, two-celled ovary. The carrot, parsley, parsnip, celery, fennel, and chervil are examples of useful plants belonging to it.

Umbler, a pigment composed of hydrated ferric and manganese oxides, with variable proportions of earthy matter. It is used as a brown pigment both when 'raw' and calcined. The latter, or 'burned' umber, is of a warmer color.

Umbrella, a portable protection against sun or rain, made of silk, cotton, or other material, extended on a framework of steel, supported by a wooden handle or stick. It is depicted in Egyptian inscriptions as early as the eleventh century B.C. Umbrellas were originally used solely as a protection against the sun. In the Middle Ages the umbrella was a mark of rank and honor, much used in ceremonial processions.

Umbrella Bird (*Cephalopterus*). There are three known species, confined to Northern South America and Central America. They are all remarkable for a large umbrella-like crest, for a bunch of long feathers on the under surface of the neck, which forms a beautiful cylindrical lappet, 6 to 13 inches long, and for their glossy black plumage.

Umbrella Tree, a popular name given to trees of several genera from the radiating nature of the leaves, especially to various species of *Magnolia* and to *Thespesia populnea*.

Umbria, a division of ancient Italy, lying east of Etruria and south of the Ager Gallicus. From the fragments known of the language—preserved chiefly in the tablets of the Iguvium or Eugubine Tables found (1444) at Gubbio and preserved there—it appears that they were closely akin in race to the Latins and Oscans. Modern Umbria comprises the province of Perugia. Perugia is the capital.

Unalaska, second largest of the Aleutian Islands, which lie just w. of the Alaskan Peninsula. It is 75 m. long, 25 m. at its greatest width, and contains the constantly smoking volcanic peak Makushin, 5,961 ft. in height. Its chief town, Unalaska or Iliuliuk, con-

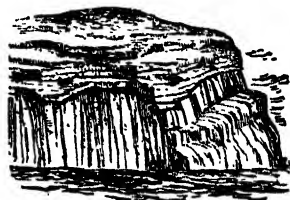
tains schools, is an outfitting station for ships, and has a trade with the Yukon.

Uncas (?—c. 1683), a sachem of the Mohegan Indians in Connecticut. In 1637 Uncas allied himself with the English against the Pequot and thereafter was regarded as a friend of the whites. In his stronghold on the Connecticut he was besieged in 1657 by Pessacus, a Narraganset, and according to tradition escaped starvation by means of supplies brought by Ensign Thomas Leffingwell, to whom he deeded the land on which the town of Norwich now stands.

Uncle Sam, a popular nickname for the United States Government or its citizens, a play on the initials 'U. S.' It first came into use about 1812, and is supposed to be based on the fact that an inspector in charge of certain U. S. stores at that time was known as 'Uncle Sam' Wilson.

Uncle Tom's Cabin. See Stowe, Harriet E. B.

Unconformity, or **Unconformability**, in geology, a structure which implies an interruption in sequence. When one set of rock beds extends over the denuded surface of another series we have what is called *unconformity*. A well-marked unconformity usually points to the lapse of a long period of time, and indicates a succession of changes.

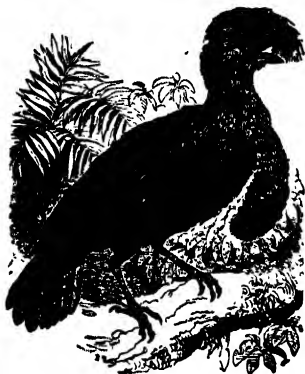


Cliff showing Unconformity of Strata.

Unconsciousness should properly denote the absence of consciousness in a being capable of it, as in sleep or coma; but it is also used in other less appropriate ways to signify (1) absence of attention or full consciousness—a usage for which psychologists now prefer to substitute the more accurate term *subconscious*; and (2) absence of reflection, as when we say that a man really holds or acts upon a principle, although he is not conscious of it. Unconsciousness may be *physiological*, as in normal sleep; *pathological*, as in cerebral hemorrhage; or *toxic*, as in chloroform anesthesia.

Underwood, Oscar Wilder (1862-1929),

American legislator, was born in Louisville, Ky. In 1894 he was elected from Alabama to Congress, where he served until 1926. In 1912 Underwood, an outstanding leader in the Democratic Party, was a contender for the Presidential nomination, but the party named Woodrow Wilson. Again, in 1928, his State delegation supported him through the long deadlock of the party convention which at the end named John W. Davis. In the latter years of his Senatorial service he was known for his opposition to Senator George W. Norris' plan of operating Muscle Shoals by the government.



Umbrella Bird.

Underwriter in insurance practice, a corporation or individual authorized to negotiate contracts for insurance, especially marine insurance. In financial practice, the underwriter is a firm or syndicate which underwrites an issue of stocks or bonds, especially in the formation of industrial corporations.

Undset, Sigrid (1882-), author, was born in Denmark. Her first novel, *Fru Marta Oulie*, appeared in 1907. Several of her books have been translated into English. Among these are *Jenny* (tr. 1920); *Kristin Lavransdatter*, (tr. 1927); *Olav Audunsson* (tr. 1928); *In the Wilderness* (tr. 1929); *Saga of the Saints* (tr. 1934); *Longest Years* (tr. 1935); *Gunnar's Daughter* (tr. 1936); *Madame Dorothea* (1940); *Return to the Future* (1942). She won the Nobel prize in 1928. She moved to the U. S., 1940.

Unemployment, a term broadly used to refer to the absence of working for wages or salary; in brief, lack of a job. The first governmental study of unemployment in the United States was in 1930 when a section of the census dealt with unemployment.

The 1930 census estimate was 3,187,647 people unemployed. The special unemployment census of January, 1931, showed an increase of 149 per cent. over that of April, 1930.

In 1933 unemployment reached its peak, with 13,689,000 persons recorded out of work in March; and with a total of 60,000,000, dependent upon the unemployed—nearly half our entire population—living below the minimum standards of life. While the economic crisis was largely the result of economic forces world-wide in extent, a good deal of its unemployment was undoubtedly due to the rapid strides which technological improvements in industry had made before and since 1929. If we consider the 'long run' only, the unemployment due to technological improvement would not be a specially serious economic and social problem. But life is not a long run, but a short one, and great numbers of people either perish economically, or suffer irretrievable injury before the necessary readjustment takes place as a result of the shifting of capital and labor. It remains for research to ascertain the length of these periods of transfer and give us the information about the forces at work in these periods, in order to diminish, if not abolish, unemployment.

The **Interstate Commission on Unemployment Insurance**, representing the Governors of New York, Ohio, Massachusetts, Pennsylvania, New Jersey, and Connecticut, in its report issued on Feb. 15, 1932, came out in favor of the compulsory establishment of state-wide systems of unemployment reserves.

Unemployment insurance became a Federal issue when the Wagner-Lewis Bill was introduced in Congress on Feb. 5, 1934. Its main provisions were: 1. A new Federal tax to be levied on every employer (except very small employers and a few special classes such as farmers, hospitals, etc.) based on his payroll after July 1, 1935. 2. The employer may offset against this 5 per cent. tax whatever he has contributed to unemployment reserves under an approved State law. 3. An additional offset would later be allowed to the employer whose rate of contribution is scaled down because of steady employment in his plant, and because of adequate reserve funds. 4. Contributions paid under a State unemployment compensation law can be offset against the Federal tax only when the State law has been certified by the Secretary of Labor as meeting certain minimum standards. 5. No State law will be

so certified unless it provides for: Regular contributions by employers; Systematic weekly benefits of at least \$7 or else 20 hours' earnings for at least ten weeks or a period fairly measured by past employment; No insuring through private insurance companies; State administration or supervision, with the assistance of joint advisory committees, representing employers, employees and the public; Impartial hearings on disputed compensation claims; Specific safeguards for labor standards and union membership.

The Special Session of the 73rd Congress in its 100 epoch-making days (1933) passed, at the request of President Roosevelt, 15 acts and created 10 new agencies to cope with the exigencies of unemployment. Through the National Industrial Recovery Administration, the President approved industrial codes guaranteeing more or less collective bargaining, abolition of child labor under 16 years of age; a minimum wage of \$14 to \$15 per week; a 40-hour week for 'white collared' employees; 30- to 40-cent an hour minimum wage and a 35-hour maximum week for factory and mechanical labor. By these measures it was hoped to return 4,000,000 men to work and to increase the weekly pay roll by \$34,000,000 by September, 1933. Among the governmental agencies for employment are the projects of the Civil Works Administration (1,500,000 employees, Dec., 1933).

During the last days of its special session, the 73rd Congress passed the Wagner Federal-State Employment Service Act, which created the United States Employment Service within the Department of Labor. The Act authorized the appropriation of \$1,500,000 for the first year and \$4,000,000 annually thereafter, three-fourths to be distributed to the States toward the maintenance of employment bureaus, on the condition that they appropriate an equal amount, the function of the Service, to coordinate local, county, State and Federal employment bureaus of the entire country. In July, 1933, it formed the National Reemployment Service to supply qualified workers for the \$3,300,000,000 public works projects. All contractors receiving Federal aid orders are obligated to obtain workers from the National Reemployment Service.

The most recent U. S. unemployment census was taken in Nov. 1946 and indicated that 2,020,000 were unemployed in the nation; in 1937, there were about 10,000,000. The Federal government had spent huge sums on work projects. De-

spite the vast number of unemployed, the business upturn in the fall of 1939 brought to light a great shortage of skilled workers in almost every trade, for the years of depression had prevented young men from working sufficiently to become skilled. During World War II employment in all major countries rose to unprecedented levels. Consult Mayo's *Human Problems of an Industrial Civilization* (1933); Polakov's *Power Age* (1933); Pierson, *Full Employment* (1941); Beveridge, *Full Employment* (1945).

Ungava, or **New Quebec**, a territory of Canada which occupies the Labrador peninsula. The climate is extremely rigorous. Temperatures of 50° and 60° F. below zero are reached in winter. The summers are very short, and there are only two seasons. Forests of spruce and birch grow as far n. as latitude 55°, but above 57° no trees grow. Fur-bearing animals include the sable, ermine, lynx, beaver, and fox. The country is desolate and uninviting, and cannot support a large population. The inhabitants are mainly Indian and Eskimo hunters. Ungava formed one of the Northwest Territories until 1912, when it was incorporated in the province of Quebec, and its name changed to New Quebec. Area, 351,780 sq. m.

Ungulata, an important order of mammals, including a great variety of forms such as the pig, camel, cow, rhinoceros, and horse. The ungulates are among the chief supports of man, from an economic standpoint, providing him with food, clothing, and working power.

Unicorn (Latin *unum cornu*, 'one horn'), a mythical creature resembling a horse, with a straight horn in the middle of its forehead, the legs of a buck, and the tail of a lion. In the Hebrew Bible the unicorn probably means a species of buffalo.

Uniforms, Military, the distinguishing costume of an army, or any military organization. The first authentic account of the use of uniforms is found in the history of the crusades, where the necessity for some distinguishing device grew out of the intermingling of the followers of different leaders. From these small beginnings military uniforms developed and passed in succeeding centuries through all stages of elaboration as to pattern and combinations of colors. The earliest uniforms worn in the United States army were naturally patterned after the British models. Realizing the necessity for adopting a color which would blend well with the average background of earth and vegeta-

tion, the British army in India began, about 1880, to make use of neutral-tinted cloth and finally adopted khaki—a yellowish drab. This color became general for British units abroad, and was finally adopted for the entire army during the South African War (1899-1902). The United States army adopted it during the Spanish-American War (1898), and used it in the Philippine insurrection (1899-1901).



Unicorn (heraldry)

The German army began experiments about the time of the South African War, and in 1908 it adopted the uniform of brownish gray, said to be the least conspicuous uniform in the field. World War I of 1914-18 added several pieces to personal equipment. The volume of shrapnel fire caused the French early in the war to adopt a steel helmet for all troops engaged, and the idea was soon copied in the other armies. Another new article was the gas mask, which furnishes clear air for breathing. The present uniform regulations for the U. S. Army were published in General Order No. 197 of 1904, but have been modified in minor details from time to time. This order declared that 'the garments, headgear, footgear, ornaments, insignia, buttons, decorations, and other articles herein specified grouped in the manner prescribed, will constitute the uniform of the United States Army, and will be worn on the occasions prescribed,' and further that 'the various articles will conform in quality, design, and color to the sealed, standard patterns deposited in the War Department.'

Uniforms, Naval. Naval uniforms of the principal maritime powers have never greatly differed, the causes producing the great

variety in army uniforms being practically inoperative on board ship. The color for all dress uniforms is a dark blue, and there are marked resemblances in style and cut, the chief dissimilarities being in the ornaments and insignia of rank.

Unimak, the largest of the Aleutian Islands, separated from the Alaska Peninsula by a narrow channel. The island is rocky and barren, and contains the active volcano Shishaldin (8,700 ft.).

Union, American Civil Liberties, an organization founded in 1920, with headquarters in New York City. It states as its object: 'Our services are for whatever degree of tolerance we can achieve, and will be until a political and economic opposition arises strong enough to defend its own rights, and in so doing to stem the tide of intolerance and repression which marks the country today.' It has fought repressive laws; opposed censorship; and asserted the rights of strikers, aliens, communists, and other minor groups. It came into prominence in 1925, through conducting the defense in the Scopes Trial in Tennessee.

Union City, city, New Jersey, formed in 1925 by the consolidation of the former towns of Union, or Union Hill, and West Hoboken; p. 56,173.

Unionidae, or **Fresh-Water Mussels**, a family of bivalves, containing many species, which are most numerous in North America. Many species yield valuable pearls.

Union of Socialist Soviet Republics (U.S.S.R.), familiarly, **Soviet Russia**, a state consisting of 16 main constituent republics, named below, which are divided in their turn into 'autonomous republics' and 'autonomous regions'—the latter being practically provinces. The area of the Union is over 8 million sq. m.; the population is estimated as over 196 millions. See **RUSSIA** and names of individual states and cities.

<i>Name of Republic</i>	<i>Capital</i>
Russian S.F.S.R.	Moscow
Byelorussian S.S.R.	Minsk
Ukrainian S.S.R.	Kiev
Azerbaijan S.S.R.	Baku
Uzbek S.S.R.	Tashkent
Armenian S.S.R.	Erivan
Georgian S.S.R.	Tbilisi
Turkmen S.S.R.	Ashkhabad
Tadjikistan S.S.R.	Stalinabad
Kazakh S.S.R.	Alma Ata
Kirghiz S.S.R.	Fruuze
Karelo-Finnish S.S.R.	Petrozavodsk
Moldavian S.S.R.	Tiraspol
Latvian S.S.R.	Riga
Lithuanian S.S.R.	Vilna
Estonian S.S.R.	Tallinn



OLIVER TWIST ASKS FOR MORE

Union of South Africa. See **South African Union.**

Uniontown, city, Pennsylvania, 70 m. s.e. of Pittsburgh. It is the center of one of the chief coke districts of the country and has foundries and machine shops, lumber and flour mills, brickyards, and carriage works; p. 21,819.

Unitarian Association, American, an organization founded in 1825 to carry on the work of the Unitarians in America. Headquarters are in Boston, where the annual meeting is held in May.

Unitarianism, the name given to the tenets of those who maintain the unipersonality as opposed to the tripersonality of the Deity. As the distinguishing doctrine of the Old Testament, Unitarianism held its ground unconsciously for a considerable time in the early Church, but gradually disappeared before the rise of the orthodox theology and under the pressure of ecclesiastical authority. Under the influence of the elder Socinus, Unitarianism gained adherents in Venetia; but Poland and Transylvania became its principal strongholds.

In the United States, Unitarianism existed long before it had an organized form. Thus in 1785 King's Chapel, Boston, adopted a liturgy framed to exclude the doctrine of the Trinity, and in 1787 settled a Unitarian pastor. Since 1815 Massachusetts, and particularly Boston, has been the stronghold of Unitarianism in America. Consult E. M. Wilbur's *History of Unitarianism*. 2 vols.

United Brethren in Christ, a religious body which arose toward the end of the eighteenth century, during a revival started among the Germans of Pennsylvania.

United Brotherhood of Carpenters and Joiners of America, an international trade union organized at Chicago in 1881.

United Colonies of New England, or **New England Confederation,** a union of the four New England colonies, Massachusetts Bay, Plymouth, Connecticut, and New Haven, formed in 1643.

United Mine Workers of America, an international labor organization of coal miners and mine workers in the United States and Canada, organized in 1890, and the largest of American trade unions. It undertakes to organize all workers in the industry.

Under the leadership of John L. Lewis, international president, the UMW showed gains in membership.

United Nations. The name "United Nations" was first used in the Declaration by

United Nations of Jan. 1, 1942, when 26 Allied Nations subscribed to the purposes and principles contained in the Atlantic Charter and pledged themselves to use their full resources for winning the war against the Axis Powers and not to make a separate peace. Other countries later adhered to this Declaration.

In October 1943 the Foreign Ministers of the USSR, the United Kingdom, the United States and the Chinese Ambassador in Moscow met in Moscow and issued a Declaration of Four Nations on General Security, usually known as the "Moscow Declaration." In this, they stated that their united action pledged for the prosecution of the war would be continued for the organization and maintenance of peace and security. They recognized "the necessity of establishing at the earliest practicable date a general international organization, based on the principle of the sovereign equality of all peace-loving States, and open to membership by all such States, large and small, for the maintenance of international peace and security."

Following informal exploratory discussions of plans for such an international organization, representatives of the United States and United Kingdom met, first with representatives of the USSR and then with those of China at Dumbarton Oaks, Georgetown, D. C., in the late summer of 1944. As the Soviet Union was not then at war with Japan, it had been considered necessary to hold separate meetings. On October 10 the Dumbarton Oaks Proposals, embodying the agreements arrived at during these meetings, were published. The Proposals provided for the establishment of an international organization, consisting of a General Assembly of all members of the organization, a Security Council, an Economic and Social Council to promote international co-operation in the economic and social fields, an International Court of Justice and a Secretariat. While the General Assembly would act as the main deliberative organ of the United Nations, the Security Council, it was decided, would have the primary responsibility for the maintenance of international peace and security. This Council, it was agreed, would have as permanent members China, the USSR, the United Kingdom and the United States, and "in due course" France and six non-permanent members elected by the General Assembly for two-year terms. However, agreement was not reached at Dumbarton Oaks on the method of voting in the Security Council.

This question was decided by President Roosevelt, Prime Minister Churchill and Marshal Stalin at the Yalta Conference, held from Feb. 4 to 12, 1945. It was then agreed that decisions on matters of procedure should be made by a majority of any seven members of the Security Council, while decisions on substantive questions should be made by seven affirmative votes including those of the permanent members of the Council. Parties to a dispute were to abstain from voting when measures for the pacific settlement of that dispute were under consideration by the Council. It was also decided at Yalta to call a conference of the United Nations to meet at San Francisco on Apr. 25, 1945, to prepare a charter for the new organization along the lines proposed at Dumbarton Oaks. Countries which had declared war on Germany or Japan and had signed the Declaration by United Nations were to be invited.

Prior to the opening of the San Francisco Conference, a Committee of Jurists from 44 countries met in Washington, D. C., from April 9 to 20 to prepare a draft Statute for the International Court of Justice. The draft prepared by the Committee was based on the Statute of the Permanent Court of International Justice, but the Committee left it to the Conference to decide whether the Court should be a continuation of the Permanent Court or whether a new court should be established.

The United Nations Conference on International Organization met at San Francisco from April 25 to June 26. It was attended by representatives of 50 countries, invitations to Argentina, the Ukrainian SSR, the Byelorussian SSR and Denmark being sent by the Conference itself. The invitation to Poland, one of the original signatories of the Declaration by United Nations, was postponed pending the formation of a Polish Provisional Government of National Unity. This Government was formed too late for Poland to participate in the conference, but in view of its early association with the United Nations it was decided that Poland should be counted as one of the original members of the United Nations. The Dumbarton Oaks Proposals, the amendments submitted to them by Governments, and the draft Statute prepared by the Committee of Jurists formed the basis for discussions at the Conference.

The Charter which emerged from the San Francisco Conference differed in many respects from the Dumbarton Oaks Proposals. For example: a preamble was added express-

ing the fundamental aims of the United Nations; the power and scope of the General Assembly were increased; France, it was decided, should be a permanent member of the Security Council "forthwith"; the purposes of the United Nations in the economic and social fields were amplified and provisions added for encouraging respect for human rights and fundamental freedoms; the Economic and Social Council was made a principal organ; three new chapters were added to the Charter, one containing a Declaration on Non-Self-Governing Territories, binding all Member Nations administering such territories to regard the interests of their inhabitants as paramount and the other two establishing an International Trusteeship System to apply to individual territories placed under it; it was decided that the International Court of Justice should be a new court, and a clause was added stating that if one of the parties to a dispute did not comply with a judgment of the Court, the other party might have recourse to the Security Council; provisions were added emphasizing the international character of the Secretariat.

One of the subjects which occasioned the most discussion at the San Francisco Conference was that of voting in the Security Council. Several delegations objected to the rule requiring the unanimity of the permanent members of the Council on all except procedural matters, particularly in regard to matters taken for the pacific settlement of disputes. In an effort to clarify the situation, the representatives of the four sponsoring Powers, China, the USSR, the United Kingdom and the United States, issued their interpretation in reply to a 22-point questionnaire. The Yalta voting formula was, however, retained, as the Sponsoring Powers made it clear that they could not accept any of the amendments proposed.

The Charter was signed on June 26, 1945, and came into force on October 24, according to its terms, after China, France, the USSR, the United Kingdom and the United States and a majority of other signatory States had ratified it.

In accordance with an Agreement on Interim Measures, signed at the same time as the Charter, provisional arrangements for the first sessions of the General Assembly and the other organs of the United Nations, for establishing the Secretariat and for convening the International Court of Justice, were made by a Preparatory Commission, consisting of one representative of each signatory

of the Charter. The Commission also, among other things, made recommendations for the organization of the principal organs.

Members.—The original Members of the United Nations are, in accordance with the terms of the Charter, those States which signed the Charter and were either at the San Francisco Conference or signed the Declaration by United Nations. Membership, it is provided, is open to other peace-loving States which accept the obligations contained in the Charter and in the opinion of the Organization are able and willing to carry them out. New Members are admitted by the General Assembly on the recommendation of the Security Council.

There are 51 original Members of the United Nations and, by December 1950, nine new Members had been admitted. They are as follows (the dates of adherence of new Members is given in parenthesis):

Afghanistan (Nov. 19, 1946)	Iraq Israel (May 11, 1949)
Argentina	Lebanon
Australia	Liberia
Belgium	Luxembourg
Bolivia	Mexico
Brazil	Netherlands
Burma (Apr. 19, 1948)	New Zealand
Byelorussian SSR	Nicaragua
Canada	Norway
Chile	Pakistan (Sept. 30, 1947)
China	Panama
Colombia	Paraguay
Costa Rica	Peru
Cuba	Philippines
Czechoslovakia	Poland
Denmark	Saudi Arabia
Dominican Republic	Syria
Ecuador	Sweden (Nov. 19, 1946)
Egypt	Thailand (formerly Siam) (Dec. 16, 1946)
El Salvador	Turkey
Ethiopia	Ukrainian SSR
France	Union of South Africa
Greece	USSR
Guatemala	United Kingdom
Haiti	United States
Honduras	Uruguay
Iceland (Nov. 19, 1946)	Venezuela
India	Yemen (Sept. 30, 1947)
Indonesia (Sept. 28, 1950)	Yugoslavia
Iran	

Organization and Functions.—The United Nations has six principal organs: the General Assembly, the Security Council, the Economic and Social Council, the Trusteeship Council, the International Court of Justice and the Secretariat.

The **General Assembly** is the main debating body of the organization. All Members are represented on it and each has one vote. Decisions on important questions are taken by a two-thirds majority of those present and voting; on other questions by a simple majority. The Assembly holds one regular

annual session, beginning on the second Tuesday in September, and may hold special sessions.

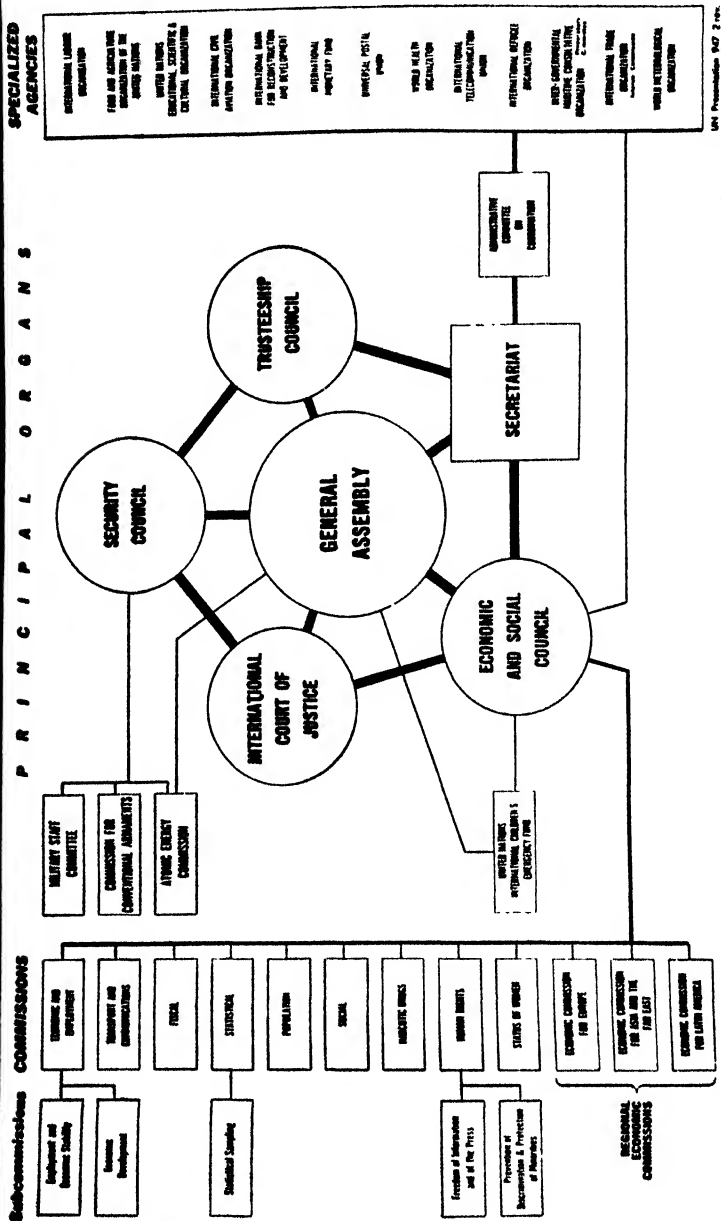
Broadly speaking, the Assembly may discuss any matter within the scope of the Charter or relating to the powers and functions of any of the organs of the United Nations. It may, according to the Charter, make recommendations on any such matters except disputes or situations being dealt with by the Security Council. In such cases, the Charter provides that the Assembly may only make recommendations if requested by the Security Council to do so. At its fifth session in 1950, however, the Assembly decided that if the Security Council, because of lack of unanimity among its permanent members, fails to exercise its primary responsibility for the maintenance of peace and security in any case where there appears to be a threat to the peace, breach of the peace or act of aggression, the Assembly is to consider the matter immediately with a view to making recommendations to Members for collective measures. These measures may include the use of armed force when necessary to maintain or restore international peace and security.

The Assembly has other functions besides considering matters affecting peace and security. It promotes international co-operation in the economic and social fields and the observance of human rights and fundamental freedoms; the Economic and Social Council functions under its authority. It is responsible for the operation of the International Trusteeship System with respect to all territories not classed as "strategic areas" (such territories come under the authority of the Security Council) and is assisted in this by the Trusteeship Council. It considers summaries and analyses prepared by the Secretariat of the information transmitted yearly by the Member countries administering these territories on the economic, social and educational conditions in non-self-governing territories. It approves the budget of the United Nations, elects the elective members of the Security and Trusteeship Councils and all the members of the Economic and Social Council, and, together with the Security Council, elects the judges of the International Court of Justice.

The Assembly also receives reports from the other organs of the United Nations. On the Security Council's recommendation, it appoints the Secretary-General. (The structure of the General Assembly is given in the table at the end of the article.)

ORGANS OF THE UNITED NATIONS

PRINCIPAL ORGANS



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United Nations

The **Security Council** consists of eleven members. Five of these, China, France, the USSR, the United Kingdom and the United States, are permanent members. The other six are elected for two-year terms of office by the General Assembly, due regard being paid to the contribution of Members to the maintenance of international peace and security and to equitable geographical distribution. Elected members are not eligible for immediate re-election. The Council functions continuously.

Decisions are made by a vote of seven members of the Council; on procedural questions the affirmative vote of any seven members suffices, but on substantive questions the majority must include the affirmative vote of the five permanent members. This is known as "the unanimity rule" or "the right of veto." One exception to this is provided for in the Charter: a member which is a party to a dispute does not vote on measures for the pacific settlement of that dispute. The practice has also grown up that the abstention of a permanent member is not to be counted as a "veto."

Under the Charter, Members of the United Nations have given the Security Council the primary responsibility for maintaining international peace and security and have agreed that in carrying out this duty it acts on behalf of all of them. They have agreed to carry out the Council's decisions. The duties of the Council fall under two headings: pacific settlement and action to deal with threats to or breaches of the peace. The Council may investigate any situation or dispute likely to threaten the peace; such disputes and situations may be brought to its attention by any Member of the United Nations, by the General Assembly and by the Secretary-General. Non-Members, if they accept in advance the obligations of peaceful settlement provided in the Charter, may bring to the Council's attention disputes to which they are parties.

Parties to a dispute are obligated to try first to settle it by peaceful means, such, for instance, as negotiation, conciliation, arbitration or judicial settlement, and resort to regional arrangements; the Council may recommend settlement by any of these means. If the disputants fail they must refer the question to the Council, which may recommend methods of adjustment or the actual terms of settlement. Legal disputes, in general, it is provided, are to be referred to the International Court of Justice.

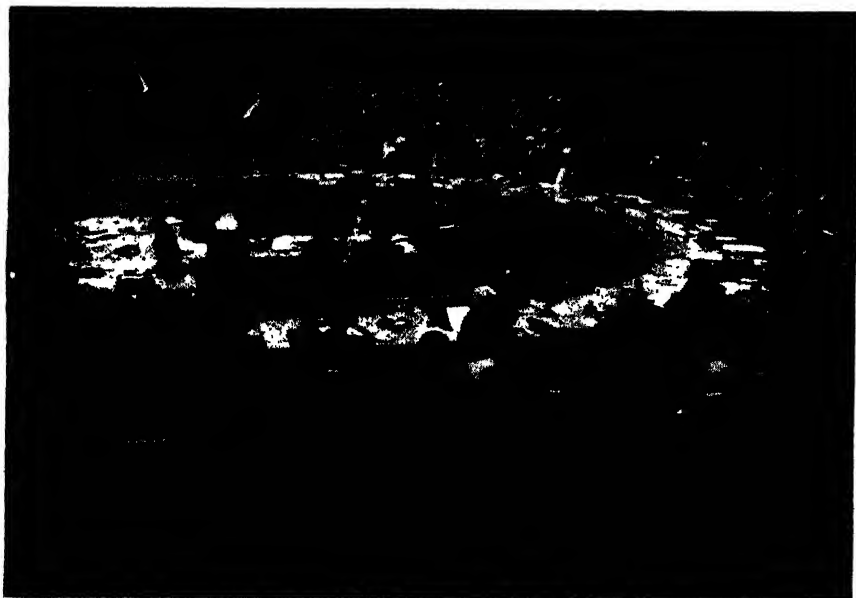
The Security Council determines the existence of any threat to the peace, breach of the peace or act of aggression, and may make recommendations or decide on enforcement measures to restore peace. To do so it may call on Members to apply measures not involving the use of armed force, such as the interruption of economic relations and of rail, sea, air, postal, telegraphic, radio and other means of communication, and the severance of diplomatic relations. If it considers these inadequate it can take action by land, sea or air forces. The Charter provides that such forces shall be placed at its disposal by Members of the United Nations. (The structure of the Security Council is given in the table at the end of this article.)

The **Economic and Social Council** consists of eighteen members, six elected each year by the Assembly for three-year terms of office. These members may be re-elected. The Council holds at least two sessions a year and may hold special sessions. Each member has one representative on the Council, and all decisions are taken by a simple majority of those present and voting.

Under the Assembly's authority, the Council is responsible for promoting: higher standards of living, full employment, and conditions of economic and social progress; solutions of international economic, social, health and related problems; international cultural and educational co-operation; and universal respect for, and observance of, human rights and fundamental freedoms for all without distinction as to race, sex, language or religion. Among the specific functions assigned to the Council are: preparation and initiation of studies and reports on international economic, social, cultural, educational, health and related matters and the making of recommendations on such matters to the General Assembly; the making of recommendations to promote respect for, and observance of, human rights and fundamental freedoms; the preparation of draft conventions and the calling of international conferences on matters within its competence. The Council also negotiates agreements bringing various inter-governmental specialized agencies, having wide international responsibilities in economic, social, cultural, health and related fields, into formal relationship with the United Nations. (For a list of the agencies with which agreements have been negotiated or are contemplated, see table at end of this article.) The Council co-ordinates the activities of these agencies through con-

*United Nations*

Ambassador Warren Austin, first representative of the United States to the United Nations.
Successor, 1952: Henry Cabot Lodge, Jr.

*United Nations*

General view of the Security Council chamber on November 29, 1950 during debate on
the Korean aggression.

sultations with them and through recommendations to the agencies, the General Assembly and Members of the United Nations. The Council also makes arrangements for consultation with non-governmental organizations concerned with matters within its competence; 87 such organizations have full consultative status, and a further 19 are on a register for *ad hoc* consultation. (For structure of the Council, see table at end of article.)

The **Trusteeship Council** is composed of those Members of the United Nations administering Trust Territories, the permanent members of the Security Council which do not administer Trust Territories, and enough other members elected for three-year terms of office by the General Assembly to ensure that the membership of the Council is equally divided between members administering Trust Territories and other members. The elective members of the Council may be re-elected. Each member has one representative on the Council, and all decisions are taken by a simple majority of those present and voting. The Council holds at least two regular sessions a year and may hold special sessions.

The Trusteeship Council, under the Assembly's authority, assists in carrying out the functions of the United Nations with regard to Trust Territories, except in those areas designated as "strategic areas." The Security Council exercises United Nations functions in "strategic areas," and is assisted by the Trusteeship Council in political, economic, social and educational matters.

Individual territories are placed under the International Trusteeship System by agreements which must be approved, except in the case of strategic areas, by the General Assembly and, in the case of strategic areas, by the Security Council. Each agreement designates the Authority which is to administer the Territory; this Authority may be one or more States or the United Nations itself.

The Council considers reports submitted by the Administering Authorities and examines petitions concerning the Territories in consultation with these Authorities. It provides for periodic visits to the Territories and formulates a questionnaire on the political, economic, social and educational advancement of the Territories on the basis of which the Administering Authorities are required to submit annual reports on each Territory for consideration by the Council. (For list of Trust Territories and members of the Council, see table at end of article.)

The members of the **International Court of Justice** are fifteen judges, elected by the General Assembly and the Security Council, voting independently, from a list of qualified persons. Candidates must be persons of high moral character, who possess the qualifications required in their respective countries for appointment to the highest judicial offices, or are jurisconsults of recognized competence in international law. No two judges may be nationals of the same State. Together, the judges represent the main forms of civilization and the principal legal systems of the world. All questions before the Court are decided by a majority of judges, provided there is a quorum of nine; in the event of a tie, the President has a casting vote.

The Court functions in accordance with its Statute, which forms an integral part of the Charter of the United Nations and was adopted at the same time. All members of the United Nations are automatically parties to the Court's Statute; other States may become so on conditions determined in each case by the General Assembly on the recommendation of the Security Council. (In addition to United Nations Members, Switzerland and Liechtenstein are parties to the Statute). Only States may be parties in cases before the Court. The Court is open to States not parties to its Statute on deposit of a declaration accepting the Court's jurisdiction, undertaking to comply in good faith with its decisions, and accepting the obligations of a United Nations Member under Article 94 of the Charter (which provides for recourse to the Security Council in the event that a party to a case before the Court fails to comply with a decision of the Court).

The Court has jurisdiction over all cases which the parties refer to it and all matters specially provided for in the Charter and treaties and conventions in force. States may declare that they accept in advance the compulsory jurisdiction of the Court in certain categories of cases.

In deciding disputes submitted to it, the Court applies: international conventions, establishing rules expressly recognized by the contesting parties; international custom, as evidence of a general practice accepted as law; the general principles of law recognized by civilized nations; and judicial decisions and the teachings of the most highly qualified publicists of the various nations as a subsidiary means of determining the rules of law. It may also decide a case *ex aequo et bono*, if the parties agree to this. Decisions

have no binding force except between the parties concerned and in respect of a particular case. The judgment of the Court is final.

The Court may also give advisory opinions to the General Assembly and the Security Council on any legal question and to other organs of the United Nations and specialized agencies, authorized by the General Assembly on any legal question coming within the scope of their work. (For members of the Court, see table at end of article.)

The **Secretariat** consists of the Secretary-General, who is appointed by the General Assembly on the recommendation of the Security Council, and such staff as the organization may require. The staff is appointed by the Secretary-General under regulations established by the General Assembly. The Charter lays stress on the international character of the Secretariat, the members of which must not seek or receive any instructions from any authority external to the United Nations. Members for their part have undertaken not to seek to influence the Secretary-General and his staff in the performance of their duties. The Secretary-General reports annually to the General Assembly on the work of the United Nations. He may bring to the Security Council any matter which in his opinion threatens the maintenance of international peace and security. (For departments of the Secretariat, see table below.)

STRUCTURE OF THE UNITED NATIONS

(January 1, 1951)

The General Assembly—Representatives of all Members of the United Nations:

MAIN COMMITTEES: all Members have the right to be represented on these Committees:

First Committee—Political and Security (including the regulation of armaments).

Second Committee—Economic and Financial.

Third Committee—Social, Humanitarian and Cultural.

Fourth Committee—Trusteeship (including Non-Self-Governing Territories).

Fifth Committee—Administrative and Budgetary.

Sixth Committee—Legal.

PROCEDURAL COMMITTEES:

General Committee—the President of the Assembly, the seven Vice-Presidents and the Chairman of the Six Main Committees.

Credentials Committee—nine members appointed at the beginning of each Assembly session on the proposal of the President.

STANDING COMMITTEES:

Advisory Committee on Administrative and Budgetary Questions—nine members elected for three years by the General Assembly.

Committee on Contributions—ten members elected for three years by the General Assembly.

OTHER SUBSIDIARY BODIES INCLUDE:

Interim Committee of the General Assembly—all Members have the right to be represented.

International Law Commission—fifteen persons elected by the General Assembly will serve for five years.

Peace Observation Commission—fourteen members appointed by the General Assembly.

Collective Measures Committee—fourteen members appointed by the General Assembly (reports also to the Security Council).

United Nations Commission for the Unification and Rehabilitation of Korea—seven members elected by the General Assembly.

United Nations Special Committee on the Balkans—eleven members elected by the General Assembly.

United Nations Conciliation Commission for Palestine—three members elected by the General Assembly.

United Nations Commissioner in Libya and Council consisting of ten members.

United Nations Tribunal—three persons selected by the Secretary-General.

United Nations Advisory Council for Somaliland—three members elected by the General Assembly.

United Nations Commissioner in Eritrea.

United Nations Relief and Works Agency for Palestine Refugees in the Near East—administered by a Director with the assistance of a 4-member Advisory Commission.

High Commissioner's Office for Refugees—administered by the High Commissioner, elected by the General Assembly on the nomination of the Secretary-General.

Special Committee on Information transmitted under Article 73e of the Charter—sixteen members, eight transmitting information and eight elected by the General Assembly.

Headquarters Advisory Committee—sixteen members elected by the General Assembly.

Board of Auditors—three members—appointed by the General Assembly for three years.

United Nations Staff Pension Committee—nine members, three elected by the General Assembly, three appointed by the Secretary-General and three elected by participants in the United Nations Joint Staff Pension Fund.

Investments Committee—three members appointed by the Secretary-General for three year terms.

Security Council:

Members—Brazil (until Jan. 1, 1953), China (permanent), Ecuador (until Jan. 1, 1952), France (permanent), India (until Jan. 1, 1952), Netherlands (until Jan. 1, 1953), Turkey (until Jan. 1, 1953), USSR (permanent), United Kingdom (permanent), United States (permanent), Yugoslavia (until Jan. 1, 1952).

Military Staff Committee—Chief of Staff, or their representatives, of the permanent members.

Atomic Energy Commission—Members of the Council and Canada when not a member of the Council.

Commission for Conventional Armaments—Members of the Council.

STANDING COMMITTEES (Each is composed of representatives of all members of the Council):

Committee of Experts

Committee on the Admission of New Members

The Economic and Social Council:

Members—Belgium (until Jan. 1, 1952), Canada (until Jan. 1, 1953), Chile (until Jan. 1, 1952), China (until Jan. 1, 1952), Czechoslovakia (until Jan. 1, 1953), France (until Jan. 1, 1952), India (until Jan. 1, 1952), Iran (until Jan. 1, 1953), Mexico (until Jan. 1, 1953), Pakistan (until Jan. 1, 1953), Peru (until Jan. 1, 1952), Philippines (until Jan. 1, 1954), Poland (until Jan. 1, 1954), Sweden (until Jan. 1, 1954), USSR (until Jan. 1, 1954), United Kingdom (until Jan. 1, 1954), United States (until Jan. 1, 1953), Uruguay (until Jan. 1, 1954).

FUNCTIONAL COMMISSIONS:

(Member countries are elected by the Economic and Social Council.)

Economic, Employment and Development Commission (fifteen members).

Transport and Communications Commission (fifteen members).

Fiscal Commission (fifteen members).

Statistical Commission (twelve members).

Sub-Commission on Statistical Sampling (five experts, one consultant).

Population Commission (twelve members).

Social Commission (eighteen members).

Commission on Human Rights (eighteen members).
Sub-Commission on Freedom of Information and of the Press (twelve experts).

Sub-Commission on the Prevention of Discrimination and the Protection of Minorities (thirteen experts).

Commission on the Status of Women (fifteen members).

Commission on Narcotic Drugs (fifteen members).
Regional Economic Commissions: Members consist of countries and territories either in or connected with the area concerned; new members and associate members are admitted by the Council. Economic Commission for Europe (eighteen members).

Subsidiary bodies include committees on coal, electric power, industry and materials, inland transport, manpower, steel, timber, the development of trade, and agricultural problems. Economic Commission for Asia and the Far East (thirteen members and ten associate members).

Subsidiary bodies include Bureau of Flood Control, committee on industry and trade, and sub-committees on iron and steel, and on travel facilities.

Economic Commission for Latin America (twenty-four members).

STANDING COMMITTEES:

Technical Assistance Committee of the Council (Members of the Council).

Council Committee on Non-Governmental Organizations (President and five members).

Agenda Committee (President, two Vice-Presidents and two members).

Interim Committee on Program of Meetings (President and five members).

SPECIAL BODIES:

Permanent Central Opium Board (eight experts).

Supervisory Body (four experts).

Executive Board of the United Nations International Children's Emergency Fund (twenty-six members—members of the Social Commission and eight other States not necessarily United Nations members elected by the Economic and Social Council).

Administrative Committee on Co-ordination (Secretary-General and executive heads of specialized agencies).

Interim Co-ordinating Committee for International Commodity Arrangements (three members).

Specialized Agencies in formal relationship with the United Nations:

International Labor Organization (ILO) works to improve labor conditions and living standards and promote social justice and economic and social welfare.

Food and Agriculture Organisation of the United Nations (FAO) works to increase agricultural production and improve distribution in order to raise standards of living and nutrition.

United Nations Educational, Scientific and Cultural Organisation (UNESCO) works to improve and increase educational, scientific and cultural facilities and to promote peace through the diffusion of knowledge and the interchange of persons and ideas.

International Civil Aviation Organisation (ICAO) works to develop the technical, economic and legal phases of international air transport, and to promote safety.

World Health Organisation (WHO) works to promote the attainment by all peoples of the highest possible level of health.

International Bank for Reconstruction and Development (Bank) works to help reconstruct and develop the economies of Member nations by making loans directly and by encouraging private investments for productive purposes.

International Monetary Fund (Fund) works to promote international monetary co-operation, the expansion of international trade, the stabilization of money values and the establishment of a multilateral system of payments.

Universal Postal Union (UPU) works to promote

international collaboration in organizing and improving the various postal services.

International Telecommunication Union (ITU) works to provide a means of regulating world-wide communications by radio, telephone and telegraph, and encourage new developments in those fields.

International Refugee Organisation (IRO) works to assist in repatriation and resettlement of refugees and displaced persons, and to protect their rights.

Specialized Agencies with which formal agreements are contemplated:

World Meteorological Organisation (WMO) works to co-ordinate, standardize and improve world meteorological activities.

International Trade Organisation (ITO) when established will work to promote expansion of world trade and removal of trade barriers, and to help solve problems relating to international trade.

Inter-Governmental Maritime Consultative Organization (IMCO) when established will work to promote co-operation among governments in technical problems of international shipping and to encourage the removal of discriminatory action by governments and of unfair restrictive practices by shipping concerns. (The United Nations has approved an agreement with this organization, but it is still to be approved by the Assembly of IMCO when that Organization comes into being.)

Trusteeship Council:

Members—

Members administering Trust Territories—Australia, Belgium, France, New Zealand, United Kingdom and United States.

Permanent members of the Security Council not administering Trust Territories—China, USSR.

Members elected by the General Assembly—Argentina (until Jan. 1, 1953), Dominican Republic (until Jan. 1, 1954), Iraq (until Jan. 1, 1953), Thailand (until Jan. 1, 1954).

Committee—

Committee on Administrative Unions (four members)

Trust Territories:

Administering Authority	Territory
Australia	Nauru
	New Guinea
Belgium	Ruanda Urundi
France	Cameroons
	Togoland
New Zealand	Western Samoa
United Kingdom	Cameroons
	Tanganyika
	Togoland
United States	Territory of the Pacific Island. (Marshalls, Marianas and Carolines)—a "strategic area" Trust Territory.

International Court of Justice:

Members—Holding office until Feb. 5, 1958:

Abdel Hamid Gadawi Pasha (Egypt), Hsu Mo (China), John Erskine Read (Canada), Bohdan Winiarski (Poland), Milovan Zorivic (Yugoslavia).

Holding office until Feb. 5, 1955:

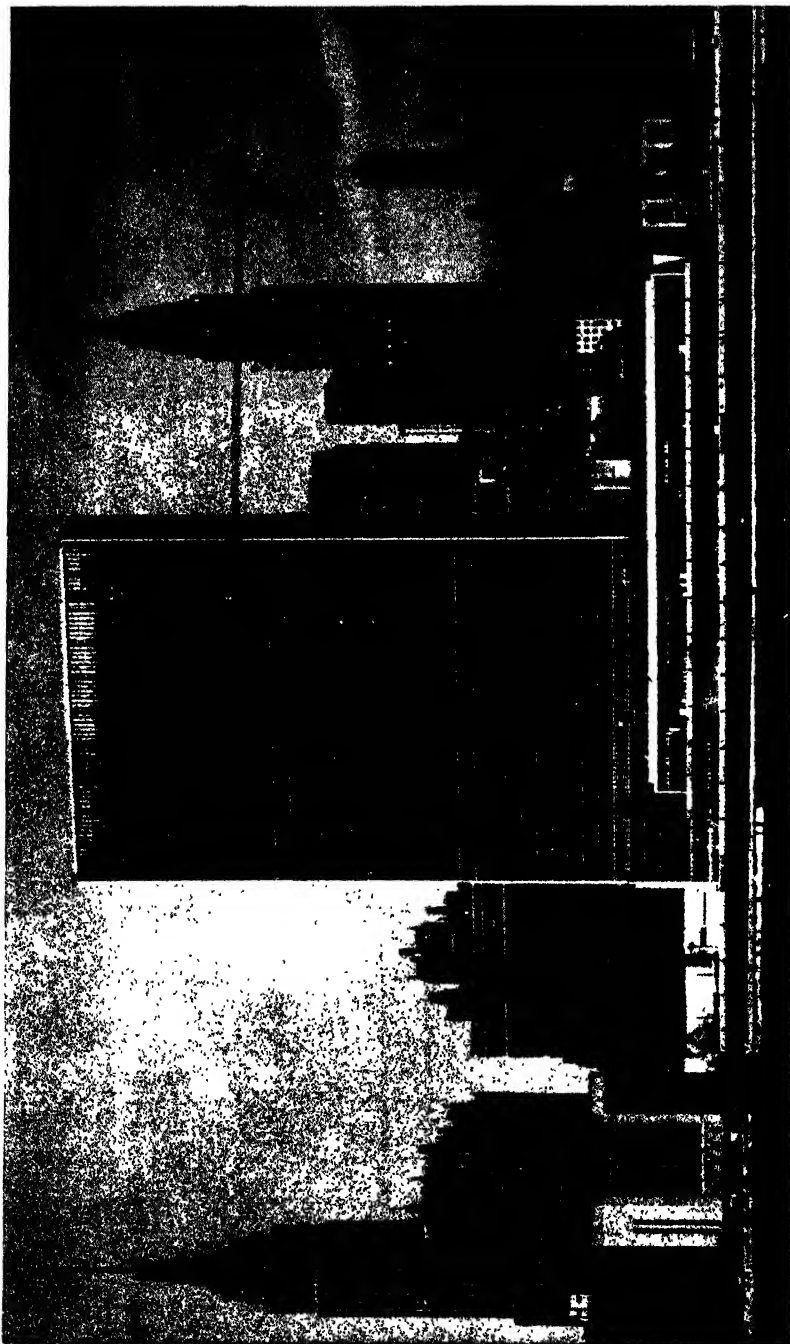
Alejandro Alvarez (Chile), José Philadelpho de Barros e Azevedo (Brazil), Jules Basdevant (France), José Gustavo Guerrero (El Salvador), Sir Arnold Duncan McNair (United Kingdom).

Holding office until Feb. 5, 1952:

Isidro Fabela Alfaro (Mexico), Green Haywood Hackworth (United States), Helge Klaestad (Norway), Sergei Borisovitch Krylov (USSR), Charles De Visscher (Belgium). Chamber of Summary Procedure—four judges and two substitutes elected annually by the Court.

Secretariat:

Secretary-General—Trygve Lide (Norway). Department of Security Council Affairs: Assistant Secretary-General—Constantin E. Zinchenko (USSR).

*United Nations*

United Nations Headquarters and Mid-town Manhattan skyline as they appear from the Long Island side of the East River.



United Nations

Mr. Trygve Lie (Norway), first Secretary-General of the United Nations. Retired 1953.

Department of Economic Affairs: Assistant Secretary-General—David Owen (United Kingdom).

Department of Social Affairs: Assistant Secretary-General—Henri Laugier (France) Department of Trusteeship and Information from Non-Self-Governing Territories: Assistant Secretary-General—Victor Hoo (China).

Department of Public Information: Assistant Secretary-General—Benjamin Cohen (Chile).

Legal Department: Assistant Secretary-General—Ivan Kerno (Czechoslovakia).

Department of Administrative and Financial Services: Assistant Secretary-General—Byron Price (United States).

Department of Conference and General Services: Assistant Secretary-General—Shamaldharee Lall (India). Technical Assistance Administration: Director-General—Hugh L. Keenleyside (Canada).

Consult *Charter of the United Nations and Statute of the International Court of Justice*; *Guide to the United Nations Charter*; *Basic Facts About the United Nations* (5th ed., 1950); *Everyman's United Nations* (2nd ed., 1950); *Yearbook of the United Nations* (annual); *Handbook of the United Na-*

tions and the Specialized Agencies (2nd ed., 1950).

BENJAMIN A. COHEN,
Assistant Secretary General,
United Nations.

United Provinces (United Provinces of Agra and Oudh), state of India. See **Uttar Pradesh**.

United Spanish War Veterans, a society organized in 1904.

United States of America, a republic, the main body of which occupies the middle portion of the North American continent from the Atlantic to the Pacific. It lies, roundly, between latitudes 25° and 49° N., and between longitudes 67° and 125° W. It extends in a north-and-south direction 1,680 m., and in an east-and-west direction 2,750

m. The gross area of land and enclosed water is 3,026,789 sq. m. Besides this main body and Alaska and Hawaii, the United States exercises jurisdiction over Puerto Rico, Panama Canal Zone, Tutuila, Guam, and the Virgin Islands.

The Atlantic coast differs widely in character in its different parts. In Maine, New Hampshire, and northern Massachusetts it is rocky. From Boston Bay southward the character changes to a low, sandy coast, in many places bordered by sand bars, back of which are lagoons and marshes. This marshy strip widens southward, becoming broadest in southern Virginia and North Carolina. In all this part of the coast the rivers broaden into estuaries in their lower courses, owing to a recent sinking of the land. The coasts of the Gulf of Mexico present similar characteristics. The Pacific coast, on the other hand, is very simple, presenting an almost unbroken front to the sea. The length of the coast line has been variously estimated, but the following figures measure it as well as any:

Atlantic coast	12,359 miles.
Gulf coast	5,744 "
Pacific coast	3,251 "
Total	21,354 miles.

The topographic features of the main body of the United States are very simple. There are two mountain systems, respectively in the East and West, between which is a broad depression drained in the main by the Mississippi river. The easterly of these systems, known as the Appalachian, stretches from Maine in the n.e. southwestward to Alabama, in which state it disappears in the plain. In New Jersey and Pennsylvania and southwestward into Georgia and Alabama, the system presents a different aspect. The eastern part consists of a succession of narrow ridges closely parallel to one another, the ridges consisting principally of sandstone, while the valleys are floored with softer and more soluble limestones. The western member of the system consists of a plateau inclined gently to the n.w., which is cut or dissected by the gorges of streams to such an extent in some places as to leave only a succession of irregular ridges and gorges. This plateau is known as the Appalachian Plateau, and locally in the North as the Alleghany and in the South as the Cumberland.

Following the eastern member of this system southward through Maryland and Virginia, the eastern of the ridges becomes known

as the Blue Ridge. In western North Carolina it develops into a broad plateau on which stand many mountain ranges. The Appalachian mountain system is succeeded on the w. by a broad depression, occupying half of the area of the country. Many of its rivers are depressed below the general level, flowing between bluffs from one hundred to four hundred ft. in height, and in a few localities there are groups and ranges of hills. The most prominent relief features in the valley consists of the Ozark Hills in southwestern Missouri, northwestern Arkansas, and the southern part of Indian Territory. In northern Minnesota are ranges of irregular, rocky hills, the products of glacial erosion. With these exceptions this vast extent of country presents no relief features of magnitude.

Most of the valley is drained by the Mississippi, the greatest river in North America, and one of the greatest on earth, whether its drainage basin, its length, or its volume be considered. The Great Lakes — Superior, Michigan, Huron, Erie, and Ontario, with their outlet, St. Lawrence river, form a great river system, whose entire drainage area is 457,000 sq. m., of which 330,000 belong to Canada and 127,000 to the United States. West of the Missouri river, in Kansas, Nebraska, North Dakota, and South Dakota, begins a long, gradual rise to the westward. For 500 m. or more the land, consisting of almost treeless prairies or plains, rises steadily to the base of the western mountains. The continuity of the Great Plains is broken in only one place, where in the western part of South Dakota an elliptical mass of mountains, known as the Black Hills, rises like an island to altitudes exceeding 7,000 ft.

The western mountain system, known as the Cordillera, is far greater in extent, height, and complexity than the Appalachian system. Its ranges rise from a great plateau, whose summit comprises nearly one-third of the area of the country, and whose altitude, varying widely in different parts, averages about 6,000 ft., with a maximum height of 10,000 ft. Upon this plateau stand hundreds of mountain ranges differing greatly in elevation, the highest summits rising between 14,000 and 14,500 ft. above the sea. For descriptive purposes this mountain region may be grouped into the Rocky Mountains, the Plateau Region, the Great Basin, the Cascade Range, the Sierra Nevada, and the Coast Ranges of the Pacific.

Parallel with the Pacific coast, but some distance inland, is a range which stretches al-

most continuously from the Canadian boundary to southern California. In Washington and Oregon it is known as the Cascade Range. Among these volcanic peaks are several of notable proportions, as Mt. Rainier in Washington, 14,363 ft. high, Mt. Hood in Oregon, 11,225 ft., and Mt. Shasta in northern California, 14,380 ft. in altitude. In California this range is known as the Sierra Nevada. It rises abruptly from the Great Basin on the e., and descends westward in long spurs, deeply furrowed by cañons. Its greatest altitude is near the southern end where it culminates in Mt. Whitney, 14,500 ft., the highest peak in the United States proper.

The streams flowing to the Atlantic rise mostly in the Appalachian Mountains and have comparatively short courses. The principal river draining the great central valley is the Mississippi. The Mississippi drains the whole breadth of the central valley, from the Appalachians on the e. to the Rocky Mountains on the w. Its main eastern branch is the Ohio river, whose sources drain the Appalachian Range from New York to Alabama. Its western branches are the Missouri, Arkansas, and Red rivers, which drain the Rocky Mountains from Canada to Texas. The great western rivers flowing to the Pacific are the Colorado, Sacramento, and Columbia, only navigable for comparatively short distances.

The rainfall varies greatly in different parts of the country, some parts being copiously watered while others are a desert for want of it. The mean annual rainfall for the country as a whole is about 30 inches. It is heaviest upon the northwestern coast (Washington and Oregon), where it sometimes exceeds 100 inches a year. It is also heavy on the coast of the Gulf of Mexico, where it reaches 70 inches. Northward up the Mississippi Valley it diminishes until about the northern lakes it is but little in excess of 30 inches. It also diminishes westward toward the plains, and at the base of the Rocky Mountains is about 15 inches. It is heavy upon the Atlantic coast, in some localities exceeding 60 inches, and decreases inland. The Cordilleran region is an arid one. Considerable rain falls upon the mountain ranges, especially on the higher ones, but the valleys throughout this section are desert or semi-desert. The parts of this region that receive the least rain, and consequently are the most desert like, are the low plateaus of Arizona and Utah, the valleys of the Great Basin, and of southern California. Here the rainfall is generally less than 10 inches, and the vegetation is scanty and of

a drought-enduring type. The Pacific coast has a well-defined wet and dry season. In the summer rain seldom falls, nearly all the precipitation occurring in winter. On the n.w. coast rain falls almost continually during the colder half of the year.

Indians. Territory and Languages.—The American continent at its discovery was sparsely occupied by an aboriginal race to which the discoverer gave the name of Indians, in the belief that the new continent was a prolongation of Asia. The name is therefore a misnomer, but has become so universally accepted that it is useless now to suggest any other. Although from n. to s. the predominant physical characteristics of red-brown skin, dark eyes, straight black hair, etc., stamped the natives as all of one race, the culture status and habit varied greatly, according to environment, while the languages are differentiated into at least a hundred distinct stocks. Ethnologists recognize fifty Indian linguistic stocks within the United States alone (excluding Alaska), each stock representing from one to a dozen or more languages, each of which again may have dialects. Below is given a list of the fifty stocks within the United States proper, as at present recognized by the Bureau of American Ethnology and other authorities:

Algonquian	Kiowan	Takilman
Athapaskan	Kitunahan	Tañoan
Attacapan	Kulanapan	Timuquanan
Caddoan	Kusan	Tonikan
Chimakuan	Mariposan	Tonkawan
Chimarikan	Moquelumnan	Uchean
Chinookan	Muskhogan	Wailatpuan
Chitimachan	Natchesan	Wakashan
Chumashan	Piman	Washoan
Coahuiltecan	Pujunan	Weitspekan
Copehan	Quoratean	Wishoskan
Costanoan	Salinan	Yakonan
Esselenian	Salishan	Yanan
Iroquoian	Sastean	Yukian
Kalapooian	Shahaptian	Yuman
Karankawan	Shoshonean	Zufian
Keresan	Siouan	

Population.—It is impossible to make any close estimate of the Indian population at the time of the discovery. A conservative calculation would probably make the Indian population of the present United States, before disturbance by the whites, considerably over 800,000. It is now officially 343,410.

Villages and House Types.—Throughout most of the United States area the Indians

had permanent settlements or villages in which they resided for the greater part of the year, excepting during the periodical hunts or other functions in which the whole community joined. The popular impression that the Indian was an aimless wanderer is entirely false. The prevailing house type of the Mississippi was the wigwam, a framework of saplings, covered with bark or mats with a door at either end and one or more fireholes in the roof; in general shape resembling a wagon top set upon the ground. It was usually communal, in some cases accommodating as many as twenty families and of corresponding length. The fixed furniture consisted chiefly of a low platform, covered with skins, which served as couch and bed. A shallow hole scooped out in the earthen floor served for fireplace, and the smoke escaped through the hole in the roof, without aid of a chimney. Every principal settlement had one large central structure for dances, councils, and other public purposes, and some towns, especially among the Iroquois, were compactly built and stockaded for defence.

Along the Missouri the permanent dwelling was the earth-lodge, a large circular or octagonal log structure, with roof rising to a rounded point in the center and covered with a foot or more of hard packed clay. The grass house of the Wichita on the Texas border was a large circular framework of heavy poles overlaid with bundles of dried grass in shingle fashion, so as to look at a distance very much like the ordinary haystack. The non-agricultural and purely hunting tribes of the plains, as well as those just mentioned, when away from their permanent villages, occupied the tepee—a name adopted from the Sioux language—a high conical tent composed of some twenty dressed buffalo skins sewn together in proper form and brought over a framework of about the same number of poles.

In the Columbia region the typical structure was the rectangular board house, with elaborate painted and carved designs, and sometimes semi-subterranean. It was generally communal, and some for public purposes were as much as 500 ft. in length.

Organization and Religion.—Each larger group usually acting together as a single independent body and speaking the same language was commonly known as a tribe, but the word is merely a convenient designation, as we know too little of the Indian organization to give it fixed meaning. In some cases

the tribe comprised but a single village or band; in other cases, as with the Sioux or Navaho, it numbered thousands of souls, in many bands with varying dialects, scattered over a large territory. Tribes were sometimes grouped into confederacies, as the Iroquois and the Creeks. There were numerous military, ritual, medicine, and work societies, among both men and women, each with its special function, dress, ceremonial, and initiation forms. Among the great religious ceremonials may be noted the Green Corn Dance thanksgiving festival of the eastern (agricultural) tribes; the Sun Dance of the Plains; the Snake Dance of the Hopi; and the Salmon Dance of the Columbia region.

The universal religion, however varying in detail of myth or ceremony, was an animistic polytheism in which animals, plants, and the phenomena of nature were deified, or, perhaps more properly speaking, regarded as the embodiments of deities. The Sun, the Rain, the Buffalo, the Snake, the Eagle, the Corn, and the Peyote cactus, were among the highest divinities. There was no supreme 'great spirit,' no heaven or hell, only a shadowy counterpart of the present life. Human sacrifice as a religious rite was rare, but existed among the Pawnee and certain southern tribes. The marriage ceremony in most tribes was a simple affair, consisting only of the giving of a present by the young man to the girl's parents, after the matter had been debated by the older people of both families and the girl's consent obtained. Polygamy was recognized, but not frequent. Divorce was a simple process, and in most tribes the children followed the mother.

Dress.—The dress was scanty, excepting on ceremonial occasions and consisted, for the man, of G-string, leggings and moccasins, with a shirt and blanket for cold weather. The woman wore a skirt belted at the waist, with leggings and moccasins, the two sometimes made as one piece. The blanket was more often of buffalo skin, dressed with the hair on the inside, or in the s.w. of rabbit skin, in woven strips. In every-day life, the warrior wore usually only the G-string and moccasins, while young children were naked. The face and sometimes the upper body were painted according to individual design. Tattooing was more or less general. In the e. the head was generally shaven with the exception of a ridge along the crest and a single scalp lock. On the Plains the hair was worn at full length, but usually gathered into a large plait hanging down in front on each shoulder

with the smaller scalp lock behind. West of the mountains it was usually cut above the eyes in front and about at the shoulder behind, or, as with the Navaho, was bunched up behind in club fashion.

Weapons and War.—The warrior's weapons were the bow, the club of wood or stone with attached handle, the knife of reed or flint, the stone-headed lance, and the round shield of buffalo hide in the open country, body armor of wicker work or tough hide in certain eastern districts and about Puget Sound, with the blowgun of cane for hunting small game in the Gulf region. The original war trophy with most tribes was the head, and the custom of scalping, so far from being general, was confined to a limited eastern territory until the introduction of fire-arms and the establishment of scalp premiums by the rival colonial governments.

Arts.—The household arts were chiefly in the hands of the woman, who, besides being cook, nurse, and dressmaker, was also farmer, skin dresser, potter, basket, mat, and blanket weaver, burden carrier, and in some cases, particularly on the Plains, the house builder. The man was the hunter and defender of the home; he made his own weapons, canoes and fish weirs, and in most tribes built the house. The beauty of much of the Indian pottery, basketry, and blanket weaving, both in design and execution, is too well known to need extended comment.

Home Life.—The home life was diversified by feasting, dancing, games and story-telling. Every important household celebration was accompanied by a feast, from the setting up of the new tepee to the boring of the ears of a new-born child. In the same way, almost every religious function from the annual thanksgiving festival to the ordinary doctor's performance over a sick patient had an accompaniment of song and dance, the instruments being the drum, rattle, whistle, and sometimes the flute or flageolet.

Funeral Customs.—The dead were disposed of in different ways, the most widespread being probably by interment in the ground. Urn burial was frequent along the eastern Gulf coast, and a custom of mummy preservation existed along the s. Atlantic coast from Virginia to Florida. The personal property of the deceased was usually sacrificed at the grave or upon the funeral pyre; the relatives showed their grief by lacerating their bodies with knives and by cutting off the hair; and for weeks thereafter the death wail went up night and morning.

Government Policy.—In 1887 the general Allotment Act inaugurated the present policy of making the Indian an individual land holder, with citizen rights and duties, and throwing open the reservations to white settlement. The whole governmental effort is now being directed toward the speedy and final absorption of the Indian into the American body politic. Under the prevailing allotment agreements, each Indian man, woman and child is made the individual owner of 80 acres of agricultural or 160 of grazing land, inalienable and free of taxes for a term of twenty-five years, with restricted citizenship privileges and a per capita share in all tribal funds.

The Federal Census for 1900 showed the total Indian population, exclusive of Alaska, to be 237,196; for 1910, 265,683; for 1920 the population was 244,437; for 1930, 328,845, and for 1950, 343,410. For the young people the Government maintains boarding schools and day schools on the reservations, and a number of boarding schools outside of reservations. In addition, Hampton Institute in Virginia, a non-sectarian, privately supported school, educates Indian pupils at the Government's expense, and various religious denominations maintain mission schools, either boarding or day, a few of which receive aid from the Government in the form of rations.

Original U. S. Territory and Accessions.—The treaty of peace with Great Britain, at the close of the Revolutionary War, gave to the United States a territory of about 828,000 sq. m., limited on the n. by the boundary as it now exists, on the s. by the thirty-first parallel of n. latitude and St. Mary's River, and on the w. by the Mississippi River. In 1803 the United States purchased from France the territory then known as the province of Louisiana. (See LOUISIANA PURCHASE.)

When in 1819 Spain sold the Floridas to the United States, the latter came into possession of the Gulf Coast as far e. as Mobile Bay. In 1835 Texas seceded from Mexico, and in 1845 was admitted as a State of the United States, bringing into the Union about 375,000 sq. m. At the close of the War with Mexico, in 1848, that country ceded to the United States an area of nearly 546,000 sq. m.; five years later, the Gadsden Purchase of about 45,500 sq. m. was made. This territory completes the main body of the United States as it is today. In 1867 Alaska, with an area of 590,884 sq. m., was purchased from Russia. In 1898 the Philippine Islands

Texas

1959—Price Daniel, D.

1961—Lyndon B. Johnson, D.

Utah

1959—Arthur V. Watkins, R.

1957—Wallace F. Bennet, R.

Vermont

1957—George D. Aiken, R.

1959—Ralph E. Flanders, R.

Virginia

1959—Harry Flood Byrd, D.

1961—A. Willis Robertson, D.

Washington

1957—Warren G. Magnuson, D.

1959—Henry M. Jackson, D.

West Virginia

1959—Harley M. Kilgore, D.

1961—Matthew M. Neely, D.

Wisconsin

1957—Alexander Wiley, R.

1959—Joseph R. McCarthy, R.

Wyoming

1961—Joseph C. O'Mahoney, D.

1959—Frank A. Barrett, R.

The members of the House of Representatives are elected by popular vote for a term of two years; the annual salary is \$12,500. To be eligible for election a person must be not less than twenty-five years old, and a citizen of the United States for seven years. The reapportionment of the House on the basis of 1940 census figures did not change the total membership of the Seventy-third Congress (1933-35) from 435. Territorial delegates from Hawaii and Alaska sit in the House, but cannot vote. Puerto Rico is represented by a resident commissioner. The presiding officer is the Speaker.

Bills may originate in either House, except measures for raising revenue, which must be introduced into the Lower House. After introduction, all bills are referred to the appropriate committees, which may report them back with recommendations for their passage, amend them, substitute new bills, report them unfavorably, or take no action. Revenue and appropriation bills are considered by the House in committee of the whole. A measure having passed one House is transmitted to the other House, where it may be passed without alterations and sent to the President for his signature, or may be amended and referred back for reconsideration. A bill becomes a law upon receiving the President's signature, or upon his failure to return it within ten days, provided Congress

is still in session. If the President vetoes a bill, he returns it to the House in which it originated, with a summary of his objections; a two-thirds vote of both Houses is then required to pass it over his veto.

The judicial power of the United States is vested by the Constitution in the Supreme Court and in such inferior courts as may be established by Congress. In 1911 the judiciary laws were revised and unified by the new Judicial Code enacted by Congress. The Federal Circuit Courts were abolished, and the Circuit Courts of Appeals and the District Courts were reorganized. For general judicial purposes the States are grouped into nine Circuit Courts of Appeals each with an assigned Supreme Court Justice and two, three, or four Circuit Judges; and the country is further subdivided into numerous District Courts.

Other special courts are the Court of Claims, which considers all civil claims against the Government except pensions claims, and the Court of Customs Appeals (established in 1909), which reviews the decisions of boards of general appraisers, and exercises other jurisdiction relative to the tariff. A third special court, the Commerce Court, created in 1910 to hear appeals from the Interstate Commerce Commission, was abolished in 1913. All of the Federal Judges are appointed by the President, subject to confirmation by the Senate. The salary of Supreme Court Justices is \$20,000; the Chief Justice receives \$500 additional. Five Judges of the Federal Court of Claims receive \$12,500 each while the judges of the U. S. Customs Court receive \$10,000.

State Government.—The State governments, like the Federal Government, rest upon written constitutions. Commonly, the legislature by majorities of two-thirds or three-fourths submits proposed amendments to the people for ratification or rejection. Resort to popular initiative and referendum for changing both constitution and statute is a development of recent times. The State governments, like the Federal Government, are organized into executive, legislative, and judicial divisions, and in numerous features their framework and methods of operation are similar. The chief executive officer is the Governor, who is elected by popular vote, and is frequently nominated by direct primary. The State legislatures are bicameral bodies, except in Nebraska which has a unicameral legislature. The State judiciary includes a supreme court or court of appeals,

a superior court, county and municipal courts, and magistrates or justices of the peace.

Territorial Government.—By the Constitution, Congress is empowered to make all needful rules and regulations for the Territories of the United States. The Territories and dependencies of the United States may be grouped into three classes, according as they are fully organized, partly organized, or unorganized. The fully organized Territories are Hawaii and Alaska. Each has a governor appointed by the President, a legislature of two houses elected by the people, and a delegate to the United States Congress. The partly organized Territory is Puerto Rico. The governor of Puerto Rico, the attorney general, a United States court, and a Supreme Court of five members are appointed by the President. Both houses of the legislature are elected by the qualified voters of the island. The Philippines are governed by their elected officers, since the country became independent when the Republic was established, on July 4, 1946, and the U. S. flag was lowered over Manila. Puerto Rico has a commissioner at Washington; the Philippines have an ambassador. The unorganized dependencies of American Samoa and Guam are administered by naval officers. The Canal Zone has a governor appointed by the President.

The government of the District of Columbia is peculiar in that its inhabitants have no voice in it. The executive head consists of three commissioners, who are appointed by the President, subject to confirmation by the Senate. Two of these commissioners must be citizens who have been residents of the District for three years; the third is detailed from the corps of engineers of the U. S. Army. Most of the associated city officials are selected by the commission. The judiciary is appointed by the President, and Congress enacts the legislation.

Local government is regulated by the individual States. For civil administration, the States are divided into counties (parishes in Louisiana); and these, in turn, are divided into smaller units, usually called towns or townships. Three general systems of local government are in existence: the town system, common to New England; the county system, prevalent in the South; and the mixed or town-county system, found in New York, New Jersey, Pennsylvania, and the North Central States.

Army.—The threat of war in Europe in 1938 and 1939 and the actual outbreak of

hostilities directed attention in the U. S. to its military forces. On June 30, 1938 there was a total of 496,810 officers and men in all components of the army. In the fall of 1939 the regular army was increased to 225,000. Then by calling up the National Guard and conscription the army contained 1,500,000 men by June 30, 1941. By the end of 1941 the U. S. Army contained 1,704,282 men and the Air Force 221,900. By Sept., 1943 the U. S. had inducted into the army 5,000,000 men, and many new military units had been created as tank, mechanized, armored, motorized, and balloon barrage units, and ski, mountain, and parachute troops.

Navy.—The naval force of the nation was rapidly on the increase in 1938 through 1943. In 1941 the navy had 201,612 enlisted men and 11,748 officers. The Marine Corps in 1942 had 75,000 men and 5,000 officers. In early 1942 the navy consisted of 15 battleships, 17 heavy cruisers with 8-inch guns, 20 light cruisers with 6-inch guns, 6 aircraft carriers, 155 destroyers, 103 submarines, 10 gunboats, 23 patrol vessels, three aircraft tenders, eight minelayers, and 41 minesweepers. Under construction or authorized were 17 battleships, 12 aircraft carriers, 48 cruisers, 170 destroyers, 82 submarines, four aircraft tenders, one minelayer and two minesweepers.

Post Office.—In the fiscal year ended June 30, 1953, postal receipts for the U. S. amounted to \$2,970,990,330, whereas the total expenses for the same period amounted to \$2,870,010,961. The total number of post offices in the U. S., as of July 1, 1954, amounted to 39,405. The rural routes numbered 32,370, and covered a total of 1,527,289 miles.

Patents.—The patent system is administered by the U. S. Patent Office, a bureau of the Department of the Interior, and directed by the Commissioner of Patents. For history and procedure see article PATENT.

Tariff.—See TARIFF.

Finance.—The net ordinary receipts of the United States Government for the fiscal year ending June 30, 1946, were \$43,037,798,808. Expenditures for the fiscal year ending June 30, 1946, were \$65,018,631,991. The gross debt of the United States on June 30, 1946, was \$259,115,345,802,369. The wealth of the nation has increased at a rate far greater than that of the population. The total wealth and per capita wealth at various times since 1860 was estimated as follows: 1860, \$16,160,000,000, per capita, \$514; 1870 (currency basis), \$30,069,000,000, per capita, \$780; 1870

(gold basis), \$24,055,000,000, per capita, \$624; 1880, \$43,642,000,000, per capita, \$870; 1890, \$65,037,000,000, per capita, \$1,036; 1900, \$88,517,000,000, per capita, \$1,165; 1912, \$186,300,000,000, per capita, \$1,950; 1922, \$320,804,000,000, per capita, \$2,918; 1929 (estimated), \$361,800,000,000, per capita, \$2,977; 1932 (estimated), \$247,300,000,000, per capita, \$1,981. In sixty-two years the nation's wealth increased almost twenty times while the wealth per capita became nearly six times as great as in 1860.

Banks and Banking.—On June 30, 1945, the 6,840 member banks of the Federal Reserve System had deposits of \$118,378,000,000, and other bank deposits had reached the peak figure, \$151,033,000,000.

Population.—The total population of Continental United States on April 1, 1950, when the latest official Census, the seventeenth in American history, was taken, amounted to 151,132,000, an increase of 28,356,954 over the Census of 1930. The 1930 census showed for the United States proper 62,137,080 males and 60,637,966 females, the males outnumbering the females by 1,499,144. This excess was 591,128 less than in 1920, and the ratio of males to females was correspondingly lower in 1930 than in 1920—102.5 males to 100 females in 1930, as compared with 104 to 100 in 1920. The high proportion of males is largely due to the fact that the United States has received large accessions by immigration, and that among immigrants the males have at all times considerably outnumbered the females. Native whites of native parentage in 1930 numbered 70,136,614, constituting 64.4 per cent. of the total population. Native whites of foreign parentage formed 15.6 per cent. of the population and those of mixed parentage 7.7 per cent.

The following are the proportions which the foreign-born bore to the total population at the various censuses since 1850: 1850, 9.7; 1860, 13.2; 1870, 14.4; 1880, 13.3; 1890, 14.7; 1900, 13.6; 1910, 14.7; 1920, 13.2; 1930, 11.6; 1940, 8.6. The foreign-born population in 1940 was chiefly derived from the following countries: Germany, 1,237,772; Italy, 1,623,580; Russia and Lithuania, 1,206,655; Poland, 993,479; Canada and Newfoundland, 1,065,480; Eire, 572,031; England, 621,975; Sweden, 445,070; Austria, 479,906; Mexico, 377,433.

Immigration.—Under the United States immigration quota law proclaimed in operation as of July 1, 1954, about 154,657 alien immigrants may be admitted yearly, as

against 164,667 under the previous law. The statistics for immigration to the United States within recent (fiscal) years are as follows: 1901-1910, 8,795,386; 1911, 878,587; 1912, 838,172; 1913, 1,197,892; 1914, 1,218,480; 1915, 326,700; 1916, 298,826; 1917, 295,403; 1918, 110,618; 1919, 141,132; 1920, 430,001; 1921, 805,228; 1922, 309,556; 1923, 522,919; 1924, 706,896; 1925, 294,314; 1926, 304,488; 1927, 335,175; 1928, 307,255; 1929, 279,678; 1930, 241,700; 1931, 97,139; 1932, 35,576; 1933, 23,068; 1934, 29,470; 1935, 34,956; 1936, 36,329; 1937, 50,244; 1938, 67,895; 1939, 82,898; 1952, 265,520. World War I caused a drop in immigration from 1915 to 1920. For the first time since 1862 immigration fell below 100,000, in 1931. The number of emigrants exceeded the number of immigrants in 1932, being 103,295.

Education.—The United States has no national system of education, each State having its own system of free public schools, supplemented by private and parochial schools. In 1940 there were 29,805,259 children of school age (5 to 17 inclusive) in the United States; 25,433,542 were enrolled in public schools. In private and parochial schools there were 3,500,000 pupils. The public schools had 194,725 male and 680,752 female teachers with salaries aggregating \$1,369,510,172 out of total school expenditures of \$2,344,048,927. In federally aided vocational schools in 1939 there were 2,086,000 students, divided 538,536 agricultural; 489,900 trade and industrial; and 278,398 home economics.

Higher education is provided for in public and private normal schools, universities, colleges, technological schools, and professional schools. In the universities, colleges and professional schools in the United States in 1953 there were 71,722 professors and instructors and 2,250,701 students (1,432,474 men and 818,227 women). That total presents a striking comparison with 1900 when 75,472 men and 38,900 women were enrolled in the colleges and universities of the U. S.

Fisheries.—Commercial fishing, prosecuted along the entire seacoast, in the Great Lakes, and in most of the coastal and interior rivers and streams, ranks as one of the important food industries. In 1942 the catch of fishery products in the United States and Alaska amounted to 3,856,548 pounds, valued at \$152,172,000 to the fishermen.

Forests.—Viewed broadly, the country may be divided naturally into six timber regions, as follows:

(1) The Northeastern States. The north-

ern part of this region is, or was, forested with conifers, mainly white pine, spruce, and hemlock. Farther to the s. these are mixed with hardwoods, while in Southern New Jersey the yellow pine is found. The white pine of this section has been largely cut out, the small portion that remains being in Northern Maine and New Hampshire, and in the mountains of Pennsylvania. The pulp mills are hard at work on the spruce trees, which are rapidly disappearing.

(2) The Southern States, across which stretches a broad belt of pine timber, extending from Southern New Jersey southwestward and westward to Northeastern Texas and Eastern Oklahoma. The lowlands of the coast and the Mississippi bottom land contain much cypress, and the mountain regions are largely covered with hardwoods.

(3) The Lake States, whose northern parts were covered with forests of white and Norway pine merging southward into hardwoods. For many years these States have been the chief source of white pine, and as a result the forests of Michigan are nearing exhaustion, those of Wisconsin are waning, and heavy inroads have been made on those of Minnesota.

(4) The Central States of the Mississippi Valley, which are characterized by hardwood forests, with varying admixtures of conifers. These have been everywhere culled for the most valuable species, and certain of them, such as the black walnut, have become practically extinct as lumber.

(5) The Rocky Mountain region, where the timber is in the main confined to the mountain slopes, and consists of a variety of coniferous species, chiefly western yellow pine.

(6) The Pacific Coast region. These forests are by far the heaviest in the United States, if not in the world, not only in stand of timber per acre, but in size of individual trees. They consist of coniferae, the prevalent tree in Western Washington and Oregon being the red fir, with some cedar, spruce, and hemlock; while in Southern Oregon yellow and sugar pine appear increasingly southward. In California, yellow pine is the predominating tree, with some sugar pine, incense cedar, and fir. *Sequoia gigantea*, the 'big tree,' the largest tree and oldest living thing on earth, is found in groves midway up the slope of the Sierra from the latitude of San Francisco southward. Some of these trees are found with diameters of 30 to 33 ft. In 1940 the Government estimated the re-

maining forests of the United States to cover 630,000,000 acres.

National Forests.—In 1891 Congress authorized the creation of forest reserves from the public lands. In accordance with this authorization, about 200,000 sq. m. in the Rocky Mountain and Pacific Coast States and Alaska, comprising nearly all the forest lands remaining to the Government, have been reserved and placed under protection and management. This is done with the purpose of obtaining from the reserved territory the largest and most valuable continuous yield of timber possible, to protect it against fire and disease, and to conserve the water supply. Lands thus reserved cannot be settled upon, unless found to be valuable chiefly for agriculture, and designated for that purpose by the Forest Service; nor can permanent private title be otherwise acquired except for the purpose of mining, for rights of way for railroads, and for irrigation works. The forests are under the control of the Forest Service of the Department of Agriculture. In 1946 there were 158 National Forests, located in 39 States and Alaska, comprising 178,000,000 acres.

Agriculture.—From an almost exclusively agricultural country the United States has, in its relatively brief existence, developed into a highly industrialized nation. In 1930 a little more than one-fifth of the occupied population was on farms; a decade earlier a little more than one-fourth was engaged in agriculture, and a century earlier, four-fifths. By 1900 the value of manufactured goods exceeded that of agricultural products. In 1930 more persons were engaged in manufacturing than in any other occupational group—28.9 per cent. of the total. According to U. S. Dept. of Agriculture estimates, people living on farms Jan. 1, 1944 totaled 25,630,000. During 1941-44, high wages in war and other industries drew large numbers from the farms, and military service reduced the farm population still further. See AGRICULTURE.

Manufactures.—The great manufacturing enterprises are irregularly distributed, their location depending largely upon the accessibility of raw products and the cost of transportation. Thus, the slaughtering and meat packing industry centers in the West; the manufacture of agricultural implements flourishes in the Lake States, where lumber and iron are abundant; the manufacture of iron and steel products is the leading industry in Pennsylvania, Ohio and Illinois, where coal and iron can be obtained at minimum cost;

while cotton manufactures are of increasing importance in the Southern States. Other factors influencing localization are water power facilities, proximity of markets, and the labor supply.

In general the region e. of the Mississippi and n. of Mason and Dixon's line is the greatest manufacturing section, though the tendency, as shown by the decennial censuses, is constantly westward. The Federal Census of Manufactures for 1929 showed that the East North Central States ranked first in value of products—\$21,663,000,000; their number of wage earners, however, 2,542,000, was less than that of the Middle Atlantic States which was 2,562,000.

In 1810 the Secretary of the Treasury estimated that the total value of manufactures for 1800 exceeded \$120,000,000. In 1939 the United States had 184,230 manufacturing establishments, which gave employment during the year to an average of 7,886,567 wage earners. These establishments paid \$9,089,940,916 in wages and turned out products to the value of \$56,843,024,800, to produce which materials costing \$32,160,106,681 were consumed.

Mineral Resources.—The United States produces in commercial quantity nearly every metal and mineral known in art and industry, and of most of them an amount sufficient for its own use and also for export—more than is produced in any other country. From 1881 to 1885 the total value of mineral products of the United States averaged \$426,000,000 per year. Mineral production reached its highest point in 1920, when it was valued at \$6,981,000,000. From the 1929 level production dropped sharply in the following two years, being \$4,765,000,000 for 1930 and \$3,180,000,000 for 1931. In 1939 production reached a value of \$4,874,000,000. The greatest advances in production have been in iron, gold, copper, lead, zinc, and aluminum among the metals, and coal, petroleum, natural gas, cement, phosphate rock, mineral waters, mineral paints, sulphuric acid, sulphur, borax, gypsum, and clay products among non-metallic minerals. The pig iron products increased from 3,835,191 long tons, valued at \$89,315,569 in 1880, to its highest production, 55,100,551 long tons in 1941. In 1939 the production was 35,677,000 long tons. Gold production was valued at \$36,000,000 in 1880, reached its highest level for the year 1940—\$210,109,000. In 1936 it was valued at \$152,509,000 and in 1935, \$126,325,000.

Silver production, worth \$34,717,000 in 1880, was almost double this figure in 1918 and 1919, and about the same in 1929; in 1933 it dropped to \$7,638,690 but in 1939 had risen to \$49,483,000. Foremost in both value and quantity, not only among non-metallic minerals but among all mineral resources, is coal, which has been mined in the United States from Revolutionary times. In 1939 the total U. S. coal production amounted to 444,552,000 tons, valued at \$919,719,000, far less than in 1920 when 658,264,932 tons with a value of \$2,564,185,000 had been produced. The yearly average for the production of crude petroleum steadily increased from 25,508,000 barrels for the period 1881-85 to 895,762,000 barrels for 1926-30. In 1939 the petroleum production amounted to 1,264,200,000 barrels with a value of \$1,400,000,000. During the depression years the production of minerals fell less sharply from 1929 levels than the output of manufactured goods. During World War II mineral experts joined to accelerate the country's mine, smelter, and other mineral-production activities.

Irrigation.—In that part of the United States west of the one hundredth meridian of west longitude, except western Washington and Oregon and northern California, the rainfall is insufficient, as a rule, for the cultivation of most crops, and resort is generally had to irrigation. In this region are many localities which, by reason of local topography, enjoy sufficient rainfall, or which are naturally irrigated. Such spots have been carefully sought out by settlers and located upon. The result is that there is a large amount of 'dry farming' in the arid region. Since 1880 more than 20,000,000 acres of land have been irrigated in the U. S. at a cost exceeding \$300,000,000. Many of the projects were built by the Federal government.

Foreign Commerce.—The total exports for the United States of merchandise (exclusive of re-exports of foreign merchandise) in 1939 were valued at \$3,174,000,000 and imports at \$2,318,000,000—a striking increase from \$1,675,000,000 and \$1,450,000,000 respectively in 1932. Before the depression years 1930-34, when nearly all figures pertaining to business and economy declined, the foreign commerce of the United States had shown a striking advance for the country's relatively brief existence. The history of the nation's foreign commerce shows that the chief growth, especially in exports, has developed since 1880. The total exports of domestic merchandise

in 1800 were \$31,840,903. The yearly average for 1876-80 was \$664,000,000. Thereafter the annual averages over five-year periods steadily rose. The average for 1921-25 was \$4,310,000,000, and for 1926-30, \$4,688,000,000—the latter figure representing an increase of about four billion dollars over export figures of fifty years earlier. From the 1929 high figure of \$5,157,000,000, exports dropped sharply in the following years. The principal countries contributing to the imports were, in the order of magnitude: Canada, Japan, United Kingdom, Germany, Brazil, Cuba, British Malaya, France, and Colombia. From the United Kingdom and France the imports under normal conditions are chiefly manufactured goods and articles for use in manufacturing; from Cuba, chiefly sugar and tobacco; from Brazil, coffee, rubber, and goat skins; from Canada, lumber, newsprint paper, cattle, sheep, fish, coal, and lead and copper in pigs; from Mexico, sisal, lead, copper, coffee, and hides and skins; from Japan and China, raw silk, tea, and miscellaneous manufactures. The principal places to which the exports of the United States were sent in 1939 were the United Kingdom, Canada, Germany, Japan, France, China, Soviet Russia, Netherlands, South America, Mexico, Sweden, Italy, and Belgium. Under normal conditions exports to the United Kingdom, Germany, France, and the Netherlands consist chiefly of cotton, meats, breadstuffs, live animals for food, copper, mineral oil, and manufactures of iron and steel. To Mexico, Cuba, China, Japan, Argentina, and British Australasia the exports include foodstuffs and miscellaneous manufactures.

Communications.—The telegraph business in the U. S. was long dominated by the Western Union and the Postal Telegraph Cable Companies. In 1943 the two companies effected a merger, becoming one company, the Western Union. Arrangement with telephone companies makes it possible to send a telegraph or cable from any telephone. There were more than 27,000,000 telephones in the U. S. in 1946, about half of all those in the world. From any one of those phones it was possible to secure a connection with any other.

Transportation.—In 1944 the railroads, to meet the demands of national defense, produced more ton miles (708,000,000,000) than in any previous year.

United States History. After the original discovery of an American island by Co-

lumbus in 1492, the first navigator to reach the mainland of the northern continent was John Cabot, in the service of England, who touched the coast of Labrador in 1497. In 1498 his son Sebastian, being foiled in an attempt to find a northwest passage, seems to have skirted the coast southward as far as Chesapeake Bay. In the 16th century at various times Portuguese and Spaniards visited the Atlantic coast, but confined their efforts to trading and the capture of Indians. Various attempts were made by the French to colonize in Canada, but not until Champlain established a settlement at Quebec in 1608 were the foundations laid for a considerable French dominion. Expeditions were sent out by the English from time to time, particularly in the reign of Elizabeth. Sir Walter Raleigh repeatedly attempted to plant a colony in what is now North Carolina, but every effort was either abandoned or destroyed.

The earlier attempts at colonization were private enterprises, and conducted with great loss to the adventurers. It was now seen that the combined capital of a mercantile company was necessary to finance so large an undertaking. The mode was to be found in the East India Company. On April 10, 1606, King James granted the first charter of the Virginia Company. This was divided into two companies, one having its headquarters in London, the other in Plymouth, England. The London and Plymouth councils were given numerous powers of a sovereign character. There was to be a government council in the colony, which elected its own president, and appointed a treasurer, but the council itself was chosen by the home company, and any laws passed had to be ratified by the same general council in England or by the king himself. The first colonists landed in Virginia on May 13, 1607, at Jamestown. In 1619 the London Company directed the governor of Virginia to summon a popular assembly, the first in the history of America. Political complications at home and the misfortunes of the company brought about the forfeiture (in 1624) of the charter, and Virginia became a royal colony, but the seeds of self-government had been safely planted. Negro slavery was introduced into the colony in 1619.

In 1620 the second English colony landed on the coast of Massachusetts. (See *PLYMOUTH COLONY*.) In 1629 a charter was granted to the 'Governor and Company of Massachusetts Bay in New England' for a

tract about the width of the present State of Massachusetts and extending to the Pacific Ocean. In 1630 the colony was organized with a thousand new emigrants, who in contrast with the Pilgrims of Plymouth were generally well-to-do. As their charter did not require the company to have its headquarters in England, they took that document with them to Massachusetts, and retained it when attempts were made to annul their rights. The terms of popular government were developed. (See MASSACHUSETTS.) In 1632 Maryland was founded by a charter issued to Cecilus Calvert, Lord Baltimore (see BALTIMORE, and MARYLAND).

Between the northern and the southern English colonies there lay for a time a foreign element. Following up the discovery of the Hudson River by Henry Hudson, who sailed under Dutch auspices, a colony called New Netherland was founded by the Dutch. In 1681 a royal patent was issued to William Penn for the great tract which became Pennsylvania. Settlers immediately flowed in, and the foundations were at once laid for a liberal constitution and a successful colony. Besides Englishmen there were many Germans, Scotch-Irish, and some Welsh, but all came under the 'Frame of Government' provided by the proprietor. Meanwhile, patents were issued for the proprietary colony of Carolina, beginning in 1663. The territory reached to the Spanish possessions on the south, and in a few years a series of vigorous settlements sprang up.

The first example of united action was the New England Confederation of 1643, including Massachusetts Bay, Plymouth, Connecticut, and New Haven. The eight commissioners, chosen by the colonies, determined all questions of war and peace, settled boundary disputes, and for 20 years took an efficient part in what may be called the external affairs of New England. In 1754, at a Congress of representatives from the various colonies which met at Albany to take steps to meet the common danger of threatened war with the French, Benjamin Franklin offered a scheme for a federal constitution, which was laid before the legislatures of the colonies. But even on the brink of war with the French and Indians this met with no acceptance either in the colonies or from the home government. While the English were planting colonies on the coast the French had been widening their sphere of influence in the interior, but on a different plan. Explorers and missionaries,

following the chain of the Great Lakes, opened up the northwest and turned southward into the Mississippi Valley. Controversies between England and France led to armed conflicts from 1690 to 1697, and notably from 1701 to 1713, but the decisive struggle was in the American side of the Seven Years' War. The English had pushed their rights to the Mississippi River, and the great region extending from that stream to the Rocky Mountains and known as Louisiana, had passed (1762) into the hands of Spain, whose feeble influence already reached also to the Pacific coast.

The navigation laws and the acts for the regulation of commerce had caused friction in the colonies, but had called out no public resistance, because the laws were systematically ignored or evaded by the Americans. To counterbalance the partiality of the law in favor of the English merchant the colonists engaged freely in smuggling. The act which gave cohesion to the forces of resistance was the Stamp Act of 1765, which required that all sorts of legal documents, newspapers, playing cards, almanacs, and various similar matters should have government stamps affixed. Another act authorized military officers to call on colonial authorities to provide quarters for troops. United action was imperative, and the Stamp Act Congress of October 7, 1765, met in New York. In 1774, when the port of Boston was closed by act of Parliament, the charter of Massachusetts revoked and arbitrary power placed in the hands of the governor, every province saw its own possible fate. Sympathy with the people of Boston was universal. The assembly of Virginia was promptly dismissed by the governor, but immediately assembled in another room and recommended the call of a Continental Congress. The matter was left in charge of the committees of correspondence in other colonies. In Virginia by May 29, 1774, a convention had been called to elect delegates. In June, Rhode Island, Massachusetts, and Maryland appointed representatives; others soon followed their example; and on September 5, 1774, the first Continental Congress met in Carpenter's Hall, Philadelphia, with representatives present from all colonies except Georgia. (See CONTINENTAL CONGRESS.) On May 15, 1776, Congress voted that all British authority in the country ought to be suppressed, and a little later committees were appointed to draft a declaration and to prepare articles of confederation. The Declaration of

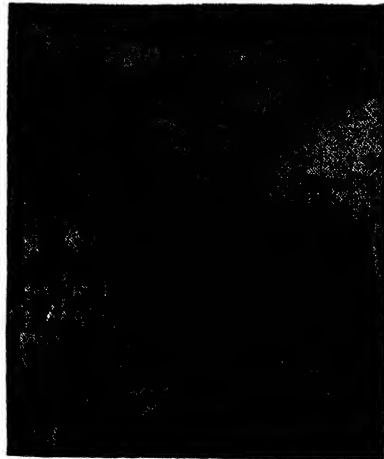
Independence, chiefly in the words of Thomas Jefferson, of Virginia, was finally adopted July 4, 1776.

The War of the Revolution was brought to a successful completion by Congress without a constitution. The surrender of Cornwallis in 1781 settled the destiny of the nation, and at about the same time the country was ready for its new Federal constitution. Peace was not definitely signed till 1783, but the duties of an independent government began earlier. The Articles of Confederation were completed after 18 months' deliberation (Nov. 15, 1777), and three years passed before the last State gave its acceptance (March 1, 1781). It was a feeble instrument, leaving almost all power in the hands of the States and nearly all of them ratified the articles at once, but the question which held back New Jersey, Delaware, and Maryland had a most important bearing on the future of the nation. New York and Virginia finally agreed to cede at least part of their claims, and the way was left open for the others. Maryland at once accepted the Articles and the Confederation went into effect. The existing Confederation was not, however, a suitable instrument for national growth. Congress, as before, was a single house of ambassadors in which each State had one vote. As there was no executive head, Congress became a recommending body with power to carry out matters to which the States consented. The Confederation had no authority over individuals, could not collect taxes or raise armies, but must raise revenues by requisition upon the States, with no power to enforce its requests.

The deficiencies of the scheme were attacked before its adoption, and the weaknesses in practice made themselves felt at once. The government was burdened with a debt of \$36,000,000 and no resources. The period of 1783 to 1789 has been called the 'critical period' in United States history. Everybody was aware of the feebleness of the Articles of Confederation, and prominent citizens everywhere called for a stronger national government. As dissatisfaction grew more pronounced, the suggestion began to be heard that a convention of the States be held to form a new plan of government. Congress approved of this action, and 12 States sent representatives. Rhode Island alone failed to send delegates. The convention was a notable body of men. The 55 delegates as a whole came from the educated and responsible classes, were experienced in law and government, and were moderate rather than radical

in their views. Washington was made chairman of the convention.

Instead of formulating a code of interstate commerce laws, the convention proceeded at once to frame a new constitution. The first great contest was over the representation in Congress. The smaller States desired a legislature with one vote for each State, but with power to enforce its requisitions. The larger States wanted two chambers, both elected by popular vote. The so-called 'Connecticut Compromise' brought about the present form of Congress, in which the lower house represents districts in proportion to population, and the Senate gives the States an equal voice. On Sept. 17, 1787, the final draft was presented to the convention for signature. By this time some delegates had



Re-enacting Washington's Landing in New York for his Inauguration.

gone because not suited with the project. Twelve States, however, were represented and 39 members signed the proposed constitution.

The struggle for and against the new plan was vigorous, those in favor being known as 'Federalists' and the opponents as 'Anti-Federalists.' In eight States there was little or no opposition to ratification. When ratification was assured, the old Congress set a date for the first Presidential election, and appointed the first Wednesday in March, 1789, as the day on which the new Congress should assemble in New York. This happened to be the 4th of March, and that date has been followed ever since for the change of administration. George Washington was elected President without opposition, and John Adams,

having received the next highest number of votes, was, in accordance with the system then in force, Vice-President.

1789-1797.—The first Congress had an important and difficult task in the organization of the new government. As it happened, the most influential men in the Congress were of that party which favored a reasonably strong central government. The Anti-Federalists, or the party opposed to the Constitution, now gradually disappeared, and for the ensuing 12 years the Federalist party was in the ascendancy. The first secretary of state was Thomas Jefferson, who was just returning from diplomatic service in France. Henry Knox, who had been secretary of war under the Confederation, was given similar duties in the Union. The Treasury Department was placed in charge of Alexander Hamilton, who was already regarded as one of the most brilliant minds of the period. There had been a post office department during the Colonial period, and this was continued with Samuel Osgood as postmaster-general. John Jay was the first chief justice of the Supreme Court. The most serious duty of the new government was to provide a revenue, and this not only for the maintenance of the new union, but to pay the debts of the old. The first tariff act was passed in 1789 after considerable discussion, but with the evident intention of giving both revenue and protection. It was a modest act in comparison with later bills, since the duties were laid only on about 30 articles and the ad valorem rates ranged from $7\frac{1}{2}$ per cent. to 15 per cent.

During Washington's administration there were troubles with Great Britain, due to different interpretations of the term neutral. The United States applied the principle that free ships made free goods, or that American vessels could not be captured because they happened to have goods of Frenchmen on board. The Americans contended that a blockade of ports must be actual, not a mere declaration. Great Britain insisted that trade between French colonies and the American coast was unlawful because forbidden by France in time of peace. Great numbers of American ships were captured by British war vessels, and under one or another of these rulings retained as prizes. Washington decided to send Chief Justice Jay as a special envoy to Great Britain to make a last effort to effect a peaceful understanding. The result was the Jay Treaty (Nov. 19, 1794), and although this did not satisfy the commercial classes, war was averted.

1797-1801.—John Adams was one of the leaders of the Federalist party at the founding of the government and continued to be an advocate of strong central administration. At the outset there had been no party formed in opposition to these views, but as time went on differences of opinion began to crystallize, and a party calling itself the 'Democratic-Republican' was in existence in Washington's second administration. This party insisted that the tendencies of Hamilton's plans were aristocratic and bound to stifle individual liberty. Jefferson was the leading mind of this 'Republican' view, and while in the cabinet, had used both direct and indirect influence against the Federalists. At the retirement of Washington the party was strong enough to poll 68 electoral votes for Jefferson against 71 for Adams. Jefferson thus became Vice-President.

In 1798, the Federalists enacted several drastic measures aimed particularly at Frenchmen and their sympathizers. One act raised the period of residence required for naturalization from 5 to 14 years; the Alien-Friends Act permitted the President to expel aliens in time of peace; the Alien-Enemies Act authorized expulsion in time of war; the Sedition Act made it a crime to thwart in any way the execution of the laws of the United States or to publish 'any false, scandalous, or malicious writing or writings' against the government, or Congress, or the President. The threatened war with France had amounted to a few sea fights only, when in 1799 Napoleon seized the power and made peace with the United States. The crisis was decisive in the development of a democratic party. The peace made by Adams was extremely unpopular, and before the accumulated obloquy of the Alien and Sedition laws the party had to give way. Jefferson was elected President in 1800, and the Federalist party never regained power.

1801-1808.—Expansion of territory was the first important step. A great empire was added to a nation just beginning to develop. The enlargement was vital to the prosperity of the country, for it concerned the outlet of the Mississippi, the economic artery of the territories. This lay in the great Louisiana territory, which in 1800, after the subjugation of Spain, passed into the hands of Napoleon Bonaparte. On November 30, 1803, New Orleans was ceremoniously turned over by the Spanish governor to a French officer, and by him, on December 20, to the United States. (See LOUISIANA PURCHASE.) At Jefferson's

suggestion, Congress sent an expedition into the still more distant west. Starting from St. Louis, May 14, 1804, a party under Lewis and Clark ascended the Missouri River to its source, crossed the mountains, and found its way down streams to the mouth of the Columbia River.

Notwithstanding the recent treaties with Great Britain, troubles did not cease. The British still insisted on their former theory of citizenship, 'Once a Briton, always a Briton,' and began again the seizure of English-speaking sailors. Remonstrance had no effect, and Jefferson objected to an increase of the navy. The situation grew worse after the retaliatory blockade system between the Continent and Great Britain had taken effect in 1806 and 1807, and culminated when the British frigate *Leopard* fired on the United States ship *Chesapeake*, boarded her on the high seas, and removed some British deserters who had enlisted in the American navy. Rather than go to war Jefferson encouraged the passage of the Embargo Act of December 22, 1807, which prohibited American ships from sailing to foreign ports in the expectation that both England and France would be starved into a change of policy. The outcry was so great that in 1809 Congress substituted the Non-Intercourse Law for the embargo, leaving commerce open with all nations except England and France. During this period Congress was called upon for action on the slavery question in the organization of new territories. By an act of 1807 the importation of slaves was forbidden after January 1, 1808.

1809-1828.—James Madison (Republican) became President in 1809 and endeavored to adjust the troubles with Great Britain by negotiation, but failed. The Congress of 1811 had been elected on the war issue and was determined to break with Great Britain. War was declared June 18, 1812, and after two and a half years of hostilities peace negotiations were completed at Ghent on Dec. 24, 1814. The treaty was favorable to the United States in returning the points occupied by the British, but there was nothing said about neutral rights or impressments, the causes of the war. The 15 years following the War of 1812 were characterized by rapid expansion in national life, in both its material and its political aspects. One of the most important factors was the rapid settlement of the West. Population moved so rapidly that in a period of 9 years (1812-21) six new States west and south of the Alleghany Mountains were admitted to the Union.

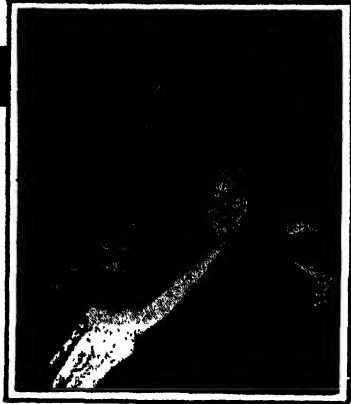
James Monroe was President from 1817 to 1825, and that period has become known as the 'Era of Good Feeling.' In the foreign affairs of the nation, two great events marked the period—the acquisition of Florida and the first enunciation of the so-called Monroe Doctrine. Relations with Great Britain were further improved at this time. The boundary line west of the Great Lakes was fixed along the 49th parallel to the Rocky Mountains and the Oregon region was to be held by joint occupation. Other complications on the Pacific coast were prevented by a treaty with Russia in 1825. The administration of Adams (1825-29) was a continuation of the tendencies already noted. Towards the close of Adam's administration the various political factions became consolidated into two fairly well defined groups—the National Republicans, who later combined with the Anti-Masons and other elements to form the Whig party; and the Democratic party, which has persisted to the present time. The National Republicans stood for internal improvements and a protective tariff, the Democrats for a strict construction of the Constitution.

1828-1836.—In 1828 Andrew Jackson defeated Adams by a large majority. With him begins a new era in politics. Under the conviction that the Federal Government should be strong but at the same time interfere as little as possible with State and individual enterprise, Jackson attacked the United States Bank and the tariff. The tariff had become a sectional question, since protection had favored manufacturers in the East and North, and the South had been unable to develop industries with slave labor as expected. The tariff act of 1833 provided for a gradual reduction of rates during the following 10 years. The object of nullification was thus obtained without its actual use and the State-rights issue was postponed. (See NULLIFICATION.) Significant for the future was the organization of the State of Texas. The slavery controversy began to take a militant attitude in the establishment of the *Liberator* in 1831, the New England Anti-slavery Society in 1832 and the American Anti-slavery Society at Philadelphia in 1833. (See ABOLITIONISTS).

Jackson's distribution of government funds among State banks gave impetus to an era of wild speculation, particularly in the West. Innumerable banks under the loose laws of the time issued notes far beyond their ability to pay, and the depreciated currency drove out gold and silver. Congress vainly attempted to restore the balance by fixing the ratio at



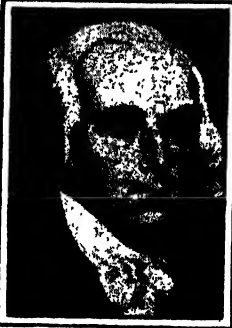
George Washington
(1789-1797)



John Adams
(1797-1801)



Thomas Jefferson
(1801-1809)



James Madison
(1809-1817)



James Monroe
(1817-1825)



John Quincy Adams
(1825-1829)



Andrew Jackson
(1829-1837)

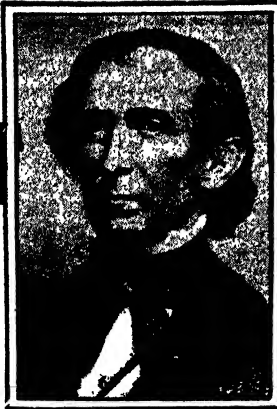


Martin Van Buren
(1837-1841)

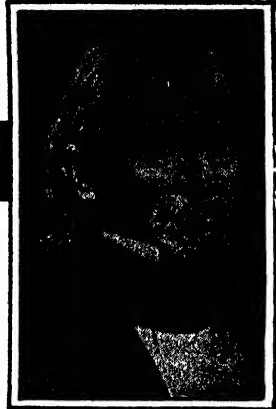
Presidents of the United States.



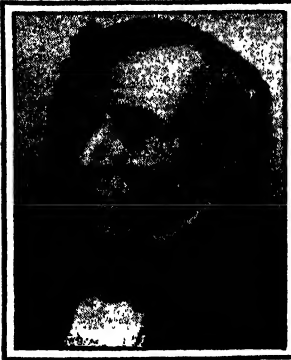
William H. Harrison
(March-April, 1841)



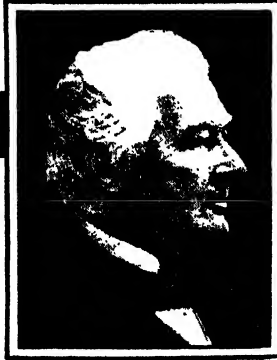
John Tyler
(1841-1845)



James K. Polk
(1845-1849)



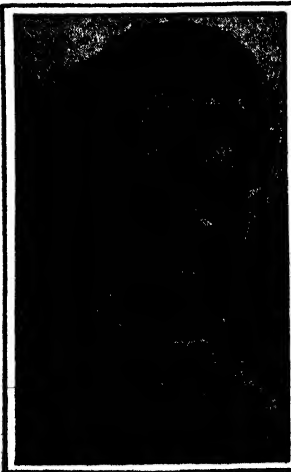
Zachary Taylor
(1849-1850)



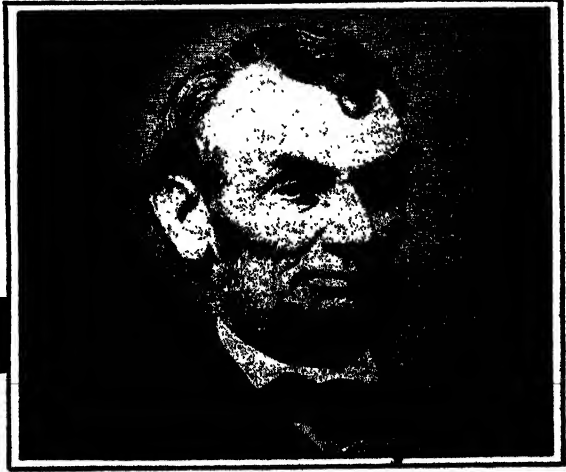
Millard Fillmore
(1850-1853)



Franklin Pierce
(1853-1857)



James Buchanan
(1857-1861)



Abraham Lincoln
(1861-1865)

Presidents of the United States.

16 to 1 (1834), but the fever for speculation struck even the State governments, which began to build canals and other public improvements and anticipated the future by borrowing many millions of money at home and abroad. The Federal funds began to accumulate great quantities of depreciated bank notes, and Jackson in alarm at the possibilities, issued, against the advice of his cabinet, the Specie Circular of 1836, directing that only gold and silver be received for public lands.

1837-1840.—In 1837 the call on the banks for the government deposits turned the stringency into a crash. The banks of the whole country suspended specie payments, business enterprises were bankrupted, and even State governments defaulted and in a few cases repudiated their debts. The weight of the financial depression fell on the administration of Van Buren, whom the Democrats elected to succeed Jackson. The Specie Currency was revoked, and \$10,000,000 in treasury notes issued. Yet Van Buren insisted on letting business work its own cure without government interference, and eventually removed the national treasury from banking operations by establishing the sub-treasury system.

1841-1845.—Discontent with the party in power gained strength, and the Whigs increased their hold on Congress and the States to such an extent that they were able to elect General William Henry Harrison as President. The campaign of 1840 was remembered as the 'Log Cabin and Hard Cider Campaign,' from the use of log-cabins and barrels of cider to symbolize the unpretentious character of the candidate. Harrison, however, died a month after his inauguration, and was succeeded by John Tyler of Virginia, who had been elected vice-president as a representative of the discontented Democrats. It now appeared that he had no sympathy with the party which had placed him in office. When the Whigs passed a bill to establish a new United States Bank, Tyler vetoed that measure, as well as a substitute framed to suit his suggestions. Popular disturbances in two of the older States were indicative of the liberalizing of political conditions. The holders of land on the old estates in eastern New York still paid annual quit-rents to the descendants of the proprietors. In 1839 these tenants began to refuse payments and a great 'Anti-rent' movement was accompanied by attacks on sheriffs and rent payers (see PATROONS). Dorr's Rebellion (1841) in Rhode Island was a protest against the high

property qualifications for citizenship; although technically it failed, it actually brought about an enlargement of the suffrage.

Relations with England were greatly improved by means of the Webster-Ashburton treaty of 1842. (See ASHBURTON TREATY.) The Texas question came forward again in 1844. Texas was more than ever necessary to the slavery party to maintain the balance in Congress. The Democrats nominated James K. Polk, known to be sound on this question. The Whigs put forward their favorite, Henry Clay, but the Liberty party drew away so many Northern votes for its candidate that Clay was defeated. Congress did not wait for the new administration to enter, but passed a joint resolution of the two houses, permitting the admission of Texas as a State. Texas accepted the conditions and was admitted to the Union in December, 1845.

1845-1848.—A war with Mexico grew out of the action on Texas since its boundaries to the southwestward had never been settled. (See MEXICAN WAR.) Meantime another territorial question had been settled with Great Britain. In June, 1846, just as the Californian republic was being founded, a treaty with Great Britain established the northern boundary of Oregon at 49°. (See NORTHWEST BOUNDARY DISPUTE.) Almost at the same moment all plans for converting California into a slave State were frustrated by the discovery of gold. Within a year more than 50,000 people poured into that region, and the migration still went on.

1849-1852.—The shifting of party lines on this question by the combination of the anti-slavery men of all parties was still more seriously felt in the Presidential election of 1848. The 'Free Soil Party' was not able to elect its own candidate, but threw the choice to the Whigs, who were not anxious to take sides.

Henry Clay came forward with a series of proposals intended to settle the slavery question for all time. (See COMPROMISE MEASURES OF 1850; FUGITIVE SLAVE LAW.) President Taylor died on July 9, 1850, before the slavery legislation had passed, but Millard Fillmore of New York, the Vice-President, completed the term in full accord with the Whig party.

1853-1856.—With Franklin Pierce of New Hampshire as President, the Democratic party returned to power in 1853. The slavery leaders began to look to Cuba as a field of expansion, and Pierce lent his aid to the movement. (See OSTEND MANIFESTO.) In the midst of this the slavery question was revived

in acute form by a bill for the organization of Nebraska territory, introduced by Stephen A. Douglas of Illinois. Nebraska was divided into two parts, one to be called Kansas. In both the question of slavery was to be determined by the people. This region had been made free territory by the Compromise of 1820, but Douglas introduced the theory that the compromise of 1850 had nullified the former. Such a statement was incorporated in the bill, and it was signed by Pierce in May, 1854. The effect of this was to throw open the whole Louisiana Purchase to possible slaveholders. Few measures passed by Congress have had more far-reaching effects than Douglas' Kansas-Nebraska Bill, and it undoubtedly hastened the outbreak of the Civil War. (See KANSAS-NEBRASKA BILL.)

1857-1860.—In the presidential campaign of 1856 the currents of party alignment became clearly evident. The Democrats remained in power and elected James Buchanan of Pennsylvania with 174 electoral votes, but the Republicans gave 114 for Frémont. The sectional division of parties became sharply defined, and the issues narrowed down to the one great question of the extension of slavery. Into this contention came the decision (1857) of the Supreme Court, in the case of Dred Scott, that a slave was not a citizen and had no standing in law and, furthermore, that Congress had no right to prohibit slavery in the territories and that slave property was guaranteed in the Constitution. The congressional elections of 1858 brought the Republican party still more to the front, and in the House they held the balance of power. The campaign was remarkable for the great debates held in Illinois between Stephen A. Douglas and Abraham Lincoln.

In 1859 occurred an event which agitated the South and the slave-holders profoundly. John Brown, a fanatical Abolitionist, attempted to raise a general insurrection of slaves. (See BROWN, JOHN.) The issue was brought to a focus in the presidential election of 1860. The Democratic convention at Charleston, S. C., in April found itself at odds. At a later convention (at Baltimore) Stephen A. Douglas was nominated. The Republican convention met in Chicago in May, 1860. Abraham Lincoln was nominated, and in consequence of the breach in the Democratic party received a large majority of electoral votes over all combined. Lincoln did not receive a majority of the popular vote, but the combined votes of all candidates who stood for union was overwhelmingly greater than

the vote for Breckinridge, the leader of the disunionists. During Buchanan's administration the leaders of the South had finally decided that separation from the Union was necessary for their cause. Now appeared to be the time to withdraw, for power was passing into the hands of a party which was opposed to slavery and called for a protective tariff unfavorable to the South. (See SECESSION; STATE RIGHTS.)

1861-1865.—Threats of secession made during the campaign had not been taken seriously in the North, but as soon as the results of the election were known the plans of the South were put into action. Jefferson Davis was made temporary and afterward regular President of the Confederacy, with Alexander H. Stephens of Georgia, Vice-President. (See CONFEDERATE STATES OF AMERICA.) In the midst of this uncertainty Lincoln took up the duties of office on March 4, 1861. About him, as his official advisers, he gathered a notable group of men. W. H. Seward was made secretary of state; S. P. Chase became secretary of the treasury; Montgomery Blair, postmaster-general; Gideon Welles, secretary of the navy; and after a year Edwin M. Stanton, a man of great force of character and unusual executive ability, became secretary of war.

The situation in the South soon called for action. On April 8, 1861, notice was sent to the governor of South Carolina that the Federal authorities would send provisions to Fort Sumter. On the 12th the Confederates began a bombardment which compelled its surrender on the 14th. (See SUMTER, FORT.) On April 15 President Lincoln called for 75,000 volunteers to uphold the Federal Government. The Northern States came forward with enthusiasm, and the demand was more than filled. On the 19th of April the Sixth Massachusetts Regiment was attacked by a mob, shots were exchanged, and the first blood of the war was spilled. Four border States which objected to the use of coercive measures against any State refused to obey the call for volunteers and joined the Confederacy. An account of the military operations of the ensuing years appears under the heading CIVIL WAR, AMERICAN. The two great political questions upon which the President was forced immediately to declare himself were slavery and secession. The President moved cautiously—for one thing he did not wish to alienate the border (slave) States which adhered to the Union—but in 1862 he decided that the time for action had about come, and

waited only for a great Union success. This the battle of Antietam provided, and on Sept. 22, 1862, he issued his preliminary Emancipation Proclamation, the final proclamation following on Jan. 1, 1863. (See EMANCIPATION PROCLAMATION.) A large element, especially in the Middle West, gradually grew tired of the war and wished it brought to an end (see COPPERHEADS), and secret societies were organized to hamper the administration, particularly in the enforcement of drafts. Consequently in the presidential election of 1864 the re-election of President Lincoln by no means seemed assured. Andrew Johnson, a Southern 'War Democrat,' was nominated for Vice-President. Gen. G. B. McClellan was nominated by the Democrats on a platform declaring war to be a failure—a platform which the nominee himself repudiated. Of the twenty-five States McClellan carried only New Jersey, Delaware, and Kentucky.

The financial administration of the United States during 1861-5 was marked by three measures of especial and probably of permanent importance—the issue of irredeemable paper money (the legal tenders or greenbacks), the creation of the national banking system, and the establishment of an unprecedentedly high protective tariff. (See TARIFF.)

Much the largest part of the war funds was obtained by loans and the issue of legal tenders. To the issue of legal tenders, or greenbacks, Chase himself was opposed, but altogether \$450,000,000 was issued during the war—this being one of the most important financial measures in the history of the United States, both in its immediate and in its remote results. (See GREENBACKS.) The need of a national banking system early became apparent to Secretary Chase, and on his recommendation such a system was established by the National Banking Acts of Feb. 25, 1863, and June 3, 1864. (See BANKING.)

Late in 1861 J. M. Mason and John Slidell were sent as Confederate commissioners to England and France respectively. While on the high seas, on an English vessel (the *Trent*), they were seized (Nov. 8) by Capt. Wilkes of the U. S. ship *San Jacinto*; and a rupture between the United States and England for a time seemed imminent. (See TRENT AFFAIR.)

During the war France took advantage of the preoccupation of the United States and in disregard of the 'Monroe Doctrine' endeavored to establish a government under Maximilian, an Archduke of Austria, in Mexico. Owing to the European situation and the threatening attitude of the United States im-

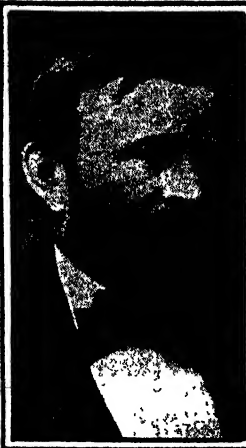
mediately after the war, Louis Napoleon withdrew his troops and the government of Maximilian collapsed. In February, 1862, a charter was granted to the Union Pacific Railroad and a bill prohibiting the coolie trade was passed. The Homestead Law of May 20, 1862, made it possible for any citizen to take up 160 acres of unappropriated public land, at \$1.25 an acre, and after an actual residence of five years on it, to own it. An act of Dec. 31, 1862, admitted West Virginia into the Union as a State; one of June 28, 1864, repealed the Fugitive Slave Law of 1850; one of March 3, 1865, established the Freedmen's Bureau; and one of the same date gave freedom to the wife and children of any former slave serving in the Federal army. General Lee surrendered to General Grant at Appomattox Court House, April 9, 1865. President Lincoln lived to see the great result assured, but on April 14, while seated in Ford's Theatre at Washington, was shot by John Wilkes Booth, an actor, who had formed with others a plan to dispose of the President and of Secretary Seward at the same time. Seward was badly wounded, and Lincoln died on the morning of April 15.

1865-1869.—Andrew Johnson, finding that Congress was opposed to his plan of reconstruction, began to denounce that body in public speeches. As the quarrel grew in bitterness Congress interfered with the appointing power of the President by the Tenure of Office Act, which required that removals, even of cabinet officers, must have the consent of the Senate. The President was impeached and tried before the Senate, with eminent counsel on both sides. After a trial lasting two months he was acquitted. (See JOHNSON, ANDREW.) In 1867 the territory of the United States was expanded a half-million sq. m. by the purchase of Alaska at a cost of \$7,200,000. On Feb. 26, 1869, Congress passed the Fifteenth Amendment to the Constitution, which gave the emancipated negroes the ballot. At the close of the war, General Grant was the most popular man in the country. In 1868 he was nominated unanimously by the Republicans, and elected President over Horatio Seymour.

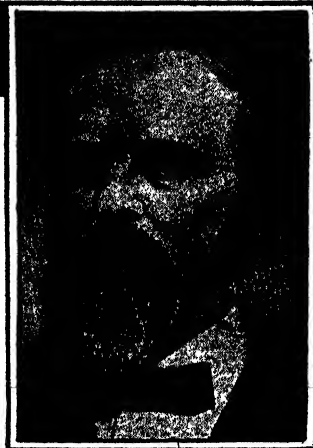
1870-1880.—Upon the first administration of Grant fell a large part of the burden of reconstruction. A group of Liberal Republicans, opposed to a policy of force, joined with the Democrats in nominating Horace Greeley who, however, was overwhelmingly defeated. President Grant, while a great soldier, was inexperienced in civil administration, and his



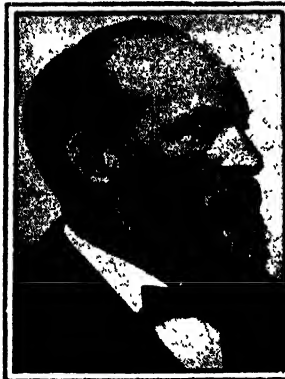
Andrew Johnson
(1865-1869)



Ulysses S. Grant
(1869-1877)



Rutherford B. Hayes
(1877-1881)



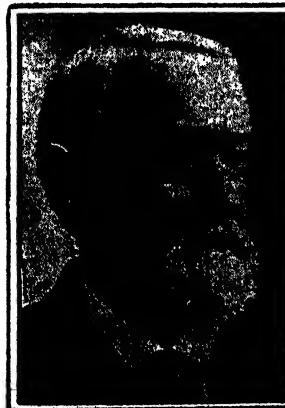
James A. Garfield
(March-Sept., 1881)



Chester A. Arthur
(1881-1885)



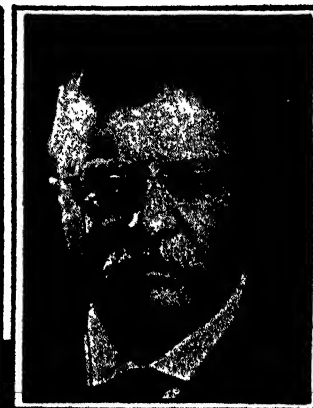
Grover Cleveland
(1885-1889) (1893-1897)



Benjamin Harrison
(1889-1893)



William McKinley
(1897-1901)



Theodore Roosevelt
(1901-1909)

Presidents of the United States.

choice of advisers was faulty. He endeavored to purify the civil service, but made no decided stand against the politicians in Congress; consequently the Federal service became demoralized. By collusion with revenue officials a gigantic 'Whiskey Ring' was formed in the West to defraud the treasury. The 'Tweed Ring' was overthrown in New York City in 1872, but not before a hundred million dollars had been stolen. The period was marked by rapid expansion of commerce and speculation. Railways were pushed forward with feverish haste. An important industrial event to the whole country was the completion of the trans-continental Union Pacific Railroad (May 10, 1869). In 1876 the hundredth anniversary of the founding of the nation was celebrated by a Centennial Exhibition in Philadelphia. In the Presidential election of 1876, Rutherford B. Hayes, Republican, was opposed by Samuel J. Tilden, one of the ablest men in the Democratic Party. The popular vote for Tilden was greater by 250,000, and he appeared to have 203 electoral votes against 166 for Hayes. In Louisiana, Florida, South Carolina, and other States, however, the elections were disputed. An Electoral Commission was finally appointed, composed of five Senators, five Congressmen, and five Justices of the Supreme Court. All the principal matters in dispute were decided by a strict partisan vote, and Hayes was declared elected. (See ELECTORAL COMMISSION.)

In 1878 the market price of silver had fallen to a ratio of about 20 to 1 in gold. The Greenback Party, which desired more currency on principle, joined in the demand for increase of silver coinage. The Bland law, passed by Congress in 1878, provided that at least \$2,000,000 and not more than \$4,000,000 per month should be coined into dollars at a ratio of 16 to 1.

1880-1890.—In 1880 James A. Garfield, Republican, was elected President, defeating Winfield S. Hancock. Garfield had been only a few months in office when he was shot (July 2, 1881) by an insane office-seeker, and after a lingering illness died (Sept. 19, 1881). He was succeeded by the Vice-President, Chester A. Arthur. The Civil Service Act of 1883 provided examinations for the classified service, prohibited removals for political reasons, and forbade political assessments by a government official or in a government building. In 1884 the prosperity of the country had so filled the national treasury that the tariff became a vital issue between the parties. The Democrats nominated

Grover Cleveland, who had been a pronounced reformer. In the hope of a purification of politics he attracted many independent voters, and defeated James G. Blaine, Republican candidate. The death of Vice-President Hendricks caused the enactment of the Presidential Succession law, providing a series of successors to the office of Chief Magistrate sufficient to cover any emergency. In 1887 the formation of a huge railroad combination led to the establishment by Congress of the Interstate Commerce Commission, a landmark in the legislation of the United States. In the Presidential campaign of 1888, the tariff became the paramount issue. Cleveland was renominated by the Democratic Party without opposition, while Benjamin Harrison was placed in nomination by the Republican Party on a strong protection platform. Harrison was elected, though Cleveland had the larger popular vote, and both Houses of Congress became Republican. The result was considered a mandate by the people to increase tariff duties, and in 1890 the McKinley bill was enacted raising the duties 50 per cent., on an average, while granting important reciprocity concessions.

1890-1900.—During Harrison's administration the Dependent Pension bill was passed. (See PENSIONS.) In 1890 the Bland law was supplanted by the Sherman law, calling for the purchase of an increased amount of silver. In 1892 President Harrison was renominated by his party, while Grover Cleveland, in spite of the opposition of the politicians whom he had offended, was again put forward by the Democrats. There was a strong demand from the West and South for free coinage of silver. Cleveland opposed this demand, and thereby lost thousands of supporters. The Republicans lost even more heavily, however. A third party appeared when many political groups of diverse views, all more or less Socialistic, profiting by the cry for free silver, united to form the 'Populist' or People's Party. Their candidate received more than a million votes. Cleveland was elected by a good majority of the electoral votes. In 1893 the business depression became a financial panic. The Wilson bill, as it came from the House, placed raw materials on the free list and substantially reduced the rates. In the Senate, however, coal and iron ore were taken from the free list, and many duties were raised. The President permitted the bill to become a law without his signature. In 1895 the Monroe Doctrine came to the fore again, owing to the boundary dispute between Great Britain and

Venezuela. Suggestions for a settlement having been frequently made to the English government, and declined, President Cleveland sent a sharp message to Congress, recommending the appointment of a commission to determine the boundary. Such a measure threatened war, but Congress voted unanimously for the commission. The British attitude presently became less rigid, however, and the matter was settled by arbitration.

In the presidential election of 1896 the Democratic Party nominated William J. Bryan, and gave the silver question the foremost place in its platform. The Populists and other small groups joined the Democrats. The Republicans spoke clearly for sound money, and chose William McKinley to be their leader. The National Democratic Party, or 'Gold Democrats,' drew some votes from the old parties, but the mass of sound money voters cast their ballots for McKinley, and he was elected. With Congress Republican, there naturally followed a return to the protective method in customs duties. The Dingley Tariff Act passed in 1897 was intended not only to restore the depleted revenues, but to maintain protection. For nearly three years a rebellion against Spain had been in progress in Cuba. The American people were already exasperated to the limit of endurance when, on Feb. 15, 1898, the U. S. battleship *Maine* was destroyed by an explosion in Havana harbor, and 266 American sailors lost their lives. Congress immediately passed measures that brought on war. (See SPANISH-AMERICAN WAR.) In August, 1898, on request of the principal inhabitants, the island of Hawaii was annexed to the United States; in 1900 it was organized into a Territory. Meanwhile a revolt in the Philippine Islands, which broke out in 1899, was crushed in 1901.

1900-1910.—In 1900 McKinley was re-elected over Bryan by a greater majority than in 1896. On Sept. 6, 1901, while attending the Pan-American Exposition at Buffalo, President McKinley was shot down by an anarchist, and died on Sept. 14. Theodore Roosevelt, Vice-President, succeeded to the Presidency, but retained the Cabinet and carried out the policies of his predecessor for the remainder of the term. A miners' strike which had brought on a perilous coal famine was settled in 1902 by a board of arbitration appointed by the President without statutory sanction, though Congress afterward approved his course. He also caused an investigation to be made of the meat packing industry, which bore fruit in a more effective meat-

inspection law, and largely owing to his activity, legislation aimed against the adulteration of food and drugs was enacted. (See PURE FOOD AND DRUG LAW.)

Colombia, in South America, showing, in 1903, a disposition to drive a sharp bargain for the Isthmian canal-construction rights she had conceded in a treaty signed with the United States, the state of Panama seceded, and her provisional government was promptly recognized by President Roosevelt; in less than one month a treaty with the Republic of Panama, conveying the same concessions, at the same price, as the original treaty with Colombia, had been signed on both sides and ratified by the United States Senate by a vote of nearly four to one. As soon as practicable, work was begun on the Canal. (See PANAMA CANAL.)

The second World's Peace Conference, which met at The Hague in response to the call of the President in 1907, included representatives of nearly fifty nations, and agreed to nearly every proposal made by the United States for the mitigation of the evils of war where war could not be avoided. By personal appeals to, and cooperation with, the governor of California and the mayor of San Francisco, the President averted a serious menace of trouble with Japan, when an element on the Pacific Coast opposed to a further influx of Japanese laborers began in 1906 a campaign to close the doors of the public schools against these people; and diplomatic negotiations were concluded looking to the restriction of Japanese immigration.

In the Philippines, the President proclaimed, on July 4, 1902, the end of an insurrection. In the same year Congress passed an act for the temporary government of the Islands. (See PHILIPPINE ISLANDS.) On May 20, 1902, the American occupation of Cuba ceased, and the officers of the republic formally took charge of the island; but in August, 1906, a rebellion broke out against the Palma administration, at whose instance the United States intervened. When confidence had been restored and a new election held, General Gomez, who had been elected President, was duly installed, and the United States authorities withdrew. In measures affecting the public service the period was eventful. The Department of Commerce and Labor was established, and the Census Office made a permanent bureau. All Indian agents, and all fourth-class postmasters in States n. of the Ohio River and e. of the Mississippi, were included in the classified civil service; and the consular

establishment was brought under a merit system of appointment and promotion. Mr. Roosevelt, having refused to be a candidate again, was instrumental in procuring the nomination for the presidency of William H. Taft, by the Republicans. Williams J. Bryan, of Nebraska, was named for the third time by the Democrats. Taft was elected. Congress, convoked in extra session, enacted the Payne-Aldrich tariff law (see *TARIFF*), which appeared to reduce duties so little as to inflame rather than compose the agitation; and in the House of Representatives, a faction, styling themselves 'Insurgent' or 'Progressive' Republicans, revolted against their Speaker, Joseph G. Cannon.

1910-1914.—The tariff was again the most prominent issue in the election of 1910, which resulted in the Democrats gaining control of the House of Representatives. Under the Interstate Commerce Act of June 18, 1910, a new Commerce Court was organized, to deal with transportation questions. An Act of Congress, approved June 25, 1910, authorized the establishment of postal savings depositories in the United States. (See *POSTAL SAVINGS BANKS*.) In May, 1911, the U. S. Supreme Court handed down important decisions declaring the Standard Oil Company and the American Tobacco Company to be unlawful combinations, and ordering their dissolution. (See *TRUSTS*.) In its handling of foreign relations, the Taft administration made a noteworthy record in several directions. An understanding was reached with Canada, disposing of the long-mooted fisheries controversy (see *ATLANTIC FISHERIES ARBITRATION*). A treaty for the protection of the seals in the North Pacific Ocean and Bering Sea was signed and ratified by Great Britain, Russia, Japan, and the United States (see *BERING SEA CONTROVERSY*). The U. S. Government joined the other leading world powers for the establishment of an international prize court (see *HAGUE PEACE CONFERENCES*).

New Mexico was admitted to statehood in January, 1912, and Arizona in February of the same year, bringing the total number of States to forty-eight. The Republicans held their national convention of 1912 at Chicago in June, and renominated W. H. Taft for President and J. S. Sherman, for Vice-President. The Democrats held their convention at Baltimore a week later, and nominated Woodrow Wilson, of New Jersey, for President, and Thomas R. Marshall, of Indiana, for Vice-President. Two months later, Theodore Roosevelt (who had unsuccessfully contested

Taft's supremacy in the Republican convention) was nominated for President at a convention held in Chicago by the newly organized Progressive Party; Hiram W. Johnson, of California, was named for Vice-President on the same ticket. On Oct. 14, Roosevelt was shot at Milwaukee by a fanatic named John Schrank and escaped a mortal wound only because the bullet, striking some hard objects in his pocket, was deflected, and Vice-President Sherman died on Oct. 30. At the ensuing election, although Wilson received a minority of the popular vote, he was elected by an overwhelming majority of the electoral vote, with Roosevelt second, and Taft third. A parcel post system went into effect on Jan. 1, 1913, and the consequent reduction of the revenues of private carriers drove the U. S. Express Company into liquidation the following year. A Department of Labor, with jurisdiction of immigration, naturalization, labor statistics, and kindred subjects, was added to the Cabinet in 1913, making the tenth portfolio. On Feb. 25 and May 31, 1913, respectively, the Sixteenth and Seventeenth Amendments to the Constitution were adopted: the first granting Congress the power to levy an income tax, and the second providing for the direct election of United States Senators. Congress passed an act already framed under the supervision of Representative Underwood of Alabama making radical reductions in the customs tariff rates (see *TARIFF*), and containing provision for an income tax which became operative in March, 1914. Another notable statute, known as the Federal Reserve Act, revised the banking system with a view to procuring greater elasticity in credits and currency, and thus offering more protection against commercial panics. With the outbreak of the European War in the summer of 1914, the administration, alarmed at the possible damage that American commerce would suffer, urged upon Congress bills for the Federal insurance of shipping owned by citizens of the United States. In its unparalleled period of 637 working days, the Sixty-third Congress passed legislation amending the Anti-Trust Law (see *TRUSTS*) and creating a Trade Commission. The Panama Canal was informally opened for traffic in August, 1914. In 1913 and 1914 the anti-liquor movement made notable strides in the United States. Although Congress refused at that time to pass a prohibition amendment to the Constitution, it did enact a statute forbidding the shipment, in interstate commerce, of intoxicating liquors intended for sale into States where such sale

was forbidden by law. Secretary of the Navy Daniels issued, in April, 1914, an order forbidding the use of liquor on any vessel or in any yard or station under his jurisdiction.

One of the first subjects to demand the attention of the Wilson administration was the Mexican situation, due to the assassination of Francisco Madero, the Provisional President, and the insistence of Gen. Victoriano Huerta on being recognized as his successor. (See *MEXICO: History*.)

1915-1919.—Early in 1915 the pressure of labor interests brought about the passage of the Seamen's bill which called for exceptionally high wages and other conditions on American ships. The subject of immigration which had occupied the attention of Congress for some time was acted upon by the passage of a bill imposing a literacy test (March 29, 1916).

In foreign affairs the attention of the Government was mainly concerned with its relations with Germany and Great Britain and with the troublous conditions in Haiti. For some time Haiti had been in a state of revolution and on June 28, 1915, the president was killed. A treaty was signed (Sept. 17) by Haiti and the United States by which the latter was to supervise the finances and the police administration, and the island became virtually a U. S. protectorate. (See *HAITI*.) On May 7, the *Lusitania* was sunk and many American lives were lost. (See *LUSITANIA*.)

Mexican affairs continued to be in a turbulent state. On Jan. 4, 1916, the Sixty-fourth Congress reconvened and almost immediately called upon the President for information about affairs in Mexico. The President gave information about the numerous killings of Americans by Mexicans not only on Mexican soil but even on that of the United States. Troubles along the border between the two countries continued and at various times the President ordered the militia of forty-five States and also soldiers of the regular Army to the Mexican border. (See *WILSON, WOODROW*.) On Aug. 4, 1916, Secretary Lansing signed a treaty with Denmark providing for the purchase of the Danish West Indies (The Virgin Islands) by the United States for \$25,000,000. This was subsequently ratified by the U. S. Senate and by Denmark. (See *VIRGIN ISLANDS*.) In domestic affairs the President at last took up the strong advocacy of legislation looking for stronger national defence. In 1916 Wilson and Marshall were re-elected President and Vice-President. The Democrats in campaigning for Wilson used the slogan 'he kept us out of war.'

In December of 1916 the approach of the United States to entrance into World War I became more evident. In spite of this, President Wilson in an address before Congress in January, 1917, stated that we must look for a termination of the war without the victory of one side or the other. This 'Peace without Victory' address brought a storm of protest at home and abroad. On April 4, 1917, the Senate passed the war resolution, and on April 6, the House of Representatives approved it. Within a few weeks the first American troops were *en route* for France. War measures now followed in rapid succession. (See *AMERICAN EXPEDITIONARY FORCES*; *EUROPE, WORLD WAR I*.) The Government soon took over the control of railroads during the war and for a period not to exceed eighteen months thereafter. Later the President was given power to take over control of shipping and of the telegraph, telephone, and cable lines. (See *GOVERNMENT CONTROL OF INDUSTRY*.) Appropriation bills for the largest amounts in history were made for the Army (\$12,000,000,000), Navy (\$1,200,000,000), and Fortifications (\$4,000,000,000). In September the House voted to raise by taxation \$8,182,492,000, a record-breaking amount. The prohibition amendment which had been submitted to the States for ratification became Article XVIII of the Constitution of the United States when on Jan. 16, 1919, Nebraska, the thirty-sixth State, ratified it. (See *PROHIBITION*.) The Peace Conference on Jan. 25 declared in favor of a League of Nations and on Feb. 14 President Wilson as chairman of the commission which had in charge the drafting of the Constitution for the League made known its structure. (See *PEACE CONFERENCE*; *LEAGUE OF NATIONS*.) The hostility of the Senate to the League of Nations had kept growing in intensity. In domestic matters the question of the return of the railroads to their owners and of the high cost of living occupied the chief attention. On Aug. 8 the President appeared before a joint session of the two houses and laid before the members the necessity of taking some action to reduce the cost of living. To that end he recommended the extension of Government control, regulation of cold storage, the sale of surplus supplies, and the establishment of fair-price committees. Steps were taken along such lines not only by the Federal, but also by the State governments. The Interstate Commerce Commission followed the settlement of a general railway strike by granting large increases in freight and passenger rates to the railroads. The

President, on September 4, 1919, began his tour of the country to make addresses in favor of the Peace Treaty, which the Senate had failed to ratify. He suffered a serious collapse and was obliged (September 28) to announce the abandonment of his tour. Repeated attempts to pass the Peace Treaty failed to secure the necessary two-thirds vote in the Senate. The nineteenth amendment to the Federal Constitution giving suffrage to the women was ratified by the thirty-sixth State (Tennessee) August 18, 1920, so that for the first time in the history of the country women throughout all of the States were entitled to vote for president. (See SUFFRAGE, WOMAN). The bitterness between the December Congress and the President did not lessen, and several bills which were passed by the legislative branch were vetoed or allowed to die by the President.

1920-1928.—President Harding assumed office on March 4, 1921, with the assurance of a large working majority of his own party in both houses of Congress. To his Cabinet he appointed some able men—Charles E. Hughes as Secretary of State and Herbert Hoover as Secretary of Commerce. The whole Congress was called together in special session shortly after the presidential inauguration, and peace with Germany and her allies with whom the United States had been at war was declared by a joint resolution which was passed by the House on June 30, and by the Senate on July 1. President Harding signed it on July 2. It was not until November 11, 1921, however, that formal ratifications with Germany were exchanged and the war technically and legally closed. The Colombian treaty was also ratified (see COLOMBIA). An immigration restriction measure was enacted May 19, 1921 (see IMMIGRATION). In spite of the rejection of the Peace Treaty and of the League of Nations there was a strong element in the Republican party in favor of some kind of agreement with the great nations of the world looking to a limitation of naval armaments and armies. To this end President Harding called an international Conference on the Limitation of Armaments to meet in Washington on Nov. 11, 1921. In the meetings of this Conference Secretary Hughes was a conspicuous figure, bringing forward proposals by which Great Britain, the United States, France, and Japan agreed to destroy certain numbers of their capital ships and reduce their naval building programs. See LIMITATION OF ARMAMENTS, CONFERENCE ON.

The chief problems before the new (Sixty-

seventh) Congress were the tariff, tax revision, and the soldiers' bonus. After months of discussion the Fordney-McCumber law was enacted Sept. 21, 1922. The matter of tax revision also dragged along for many months. Before the end of the year, however, a new revenue measure was enacted and approved (Nov. 23, 1921) by the President. A bonus bill passed both houses of Congress, but was vetoed by the President on the ground that economic considerations were opposed to such legislation at that time. In his message to the Senate on Feb. 24, 1923, President Harding urged the adhesion of the United States to the International Court of Justice at The Hague, but no action was taken before the adjournment of Congress on March 3. On June 20, 1923, President Harding left Washington for a 39 days tour of the Western States and Alaska. He was taken suddenly ill on July 28, and on Aug. 2 died in San Francisco, from a stroke of cerebral apoplexy (see HARDING, WARREN G.). On the following day at 2:43 A.M. Vice-President Coolidge took the oath of office as 30th president of the United States. For a time President Harding's cabinet continued in office under President Coolidge. The enforcement of prohibition, which was becoming increasingly difficult, was pledged by the Council of Governors at their meeting in October, and Great Britain agreed to the search of British vessels twelve miles from the coast of the United States. Before Congress met in December (1923) the existence of widespread corruption in the Veterans' Bureau during the Harding administration became evident and conflict between Governor Wood and the Philippine legislature was constant. During the year 1924, the insurgent Republican 'bloc' in Congress, mainly representing the farming areas of the West and Northwest, made it difficult for all the President's policies to be carried out. Congress maltreated the tax reduction plan of Secretary Mellon; passed the soldiers' bonus over the president's veto; failed to take action on a minimum wage bill for women; made the immigration law drastic for the Japanese, and failed to provide for the sale of Muscle Shoals. Charles G. Dawes, Owen D. Young, and Henry M. Robinson were appointed on the committee of experts to assist in European reparation matters, and their final report became known as the Dawes plan (see REPARATIONS). Woodrow Wilson died on Feb. 3, 1924, at the age of 67. Following the exposure of corruption in the Veterans' Bureau, other disclosures followed involving A. B. Fall (for-

merly Secretary of the Interior under President Harding) with two oil magnates, E. L. Doheny and Harry F. Sinclair. Fall had resigned, but the Senate, on Feb. 11, passed a resolution requesting President Coolidge to call for the resignation of the Secretary of the Navy, Edwin Denby, who resigned Feb. 18, 1924. Attorney General Daugherty refused to resign until requested to do so by President Coolidge in March. In the November elections the Republican candidates were elected by decisive majorities. In his message to the last session of the Sixty-eighth Congress, in December, President Coolidge urged rigid economy in public expenditures, the repeal of the publicity clause in the income tax law, the sale of Muscle Shoals, the consolidation of railroad systems, no competition with foreign states in the building and maintaining of a navy and an army, encouragement of the limitation of armaments, participation in the Permanent Court of International Justice with the understanding that the United States should not be bound by advisory opinions or enter the League of Nations, strict enforcement of the prohibition act, and reorganization of the administrative departments. During the year 1925 the Dawes plan, in which the United States had played so large a part, worked out well. The enforcement of the Federal prohibition act, which involved continually increasing expenditures, became one of the great issues.

In January and following months the investigation of the alleged corruption in some of the departments under the Harding administration continued. Former Secretary Fall was rebuked by the Senate, and Colonel Forbes was convicted of conspiracy in his management of the affairs of the Veterans' Bureau. In May, Fall, Sinclair, and Doheny were re-indicted. In foreign affairs the Senate in January requested President Coolidge to call a second disarmament conference; in February the United States delegates to the international opium conference quit the meeting; troubles with Mexico were intensified.

The Sixty-ninth Congress convened Dec. 7, 1925, and on the following day the President asked for authority to enable him to deal with the coal strike in the anthracite fields of Pennsylvania, urged national economy, Federal tax reduction, regard for States rights, and participation in the World Court. No improvement was made in the enforcement of the prohibition act. The Supreme Court of the United States decided that a vehicle found in use in violation of the act could be con-

fiscated, even if stolen from an innocent party, and that provision of the law limiting physicians to the prescription of one pint of whiskey within a ten-day period was valid (5 to 4 decision). The latter part of 1926 and the early months of 1927 were marked by great discoveries and events in connection with telephonic communication across the Atlantic and talking motion pictures reproduced over the radio; the crossing of the North Pole by airship and by aeroplane (see ARCTIC EXPLORATION); the circling of the globe in twenty-eight days, by Edward Evans and Linton Wells; the gathering of the Eucharistic Congress in Chicago. In February 1927, official notification was sent to the State Department by Great Britain and two other powers that the terms on which the United States was willing to become a member of the World Court were impossible to accept. This act was regarded in official Washington as definitely ending the possibility of the United States entering the Court. Strained relations with Mexico continued, centering particularly about laws passed by the latter concerning property, especially oil lands, owned by American citizens. The situation was complicated by conditions in Nicaragua. The President sent Henry L. Stimson as a peace emissary. On May 6, he announced peace between the two parties and arrangements made for American supervision of the elections in 1928.

In the dispute between Peru and Chile, Secretary of State Kellogg announced in July 1928, that he had persuaded the two countries to resume diplomatic relations which had been suspended since 1911. He was also able to announce (August 1927) that he had signed the Pact of Paris renouncing war as an instrument of national policy.

1929-1932. — After his inauguration in March, 1929, President Hoover called the new Congress into special session on April 15, to consider farm relief and the tariff. The Agricultural Marketing Act creating a farm board and providing it with a million and a half dollars for expenses and a five hundred million revolving fund to lend to co-operative associations of farmers was passed and signed by the President, June 15.

Following World War I there had been an era of remarkable prosperity. Speculation ran riot in industry, real estate and finance. Prices for commodities, stocks, and land rose out of all proportion to their values. Florida suffered badly from a collapse of inflated land values. In March 1929, there was a slump in the New York Stock Market and in Septem-



William H. Taft
(1909-1913)



Woodrow Wilson
(1913-1921)



Warren G. Harding
(1921-1923)



Calvin Coolidge
(1923-1929)



Franklin D. Roosevelt
(1933-1945)



Herbert C. Hoover
(1929-1933)

Presidents of the United States.

ber and following months there came a crash from which trade, industry and labor suffered acutely. Unemployment became a serious problem and in 1930 bills for its alleviation were introduced in various State legislatures and in Congress. The enforcement of the prohibition act still continued to be one of the great issues during the closing years of President Coolidge's administration and of the opening years of his successor. In February 1929, Congress passed the Jones Act which virtually made violation of the prohibition act a felony.

The subject of chief importance from 1930 to 1940, however, which gave rise to most of the significant legislative, executive, and popular activities, was the serious economic depression. (See UNEMPLOYMENT). The government inaugurated various relief measures, but it was planned to have the various localities, whether state or city, take care of their own needy by popular subscriptions and extensive public works, rather than to deal with the problem on a national basis. Discontent with the economic depression and the consequent attribution of it to the party in power was expressed in the Congressional elections of Nov. 4, 1930. For the first time in twelve years, when the Seventy-second Congress convened on Dec. 7, 1931, the Democrats were able to organize the House, electing Representative John N. Garner, of Texas, Speaker.

One of the most important steps during 1931 to relieve the world-wide depression was instituted by President Hoover, on June 20, with his proposal for a moratorium on intergovernmental debts. Briefly, he suggested that payment of all intergovernmental debts arising from World War I be suspended during one year, from July 1, 1931, to June 30, 1932.

After heated controversy, Congress accepted the moratorium proposal on December 23. Grave problems confronted the first session of the Seventy-second Congress, from Dec. 7, 1931, to July 16, 1932. The deficit for the first half of the fiscal year 1932 was more than \$1,385,000,000; banks were still failing (for the year ended Oct. 30, 1931, there had been 2,342 bank failures); the railroads were in serious plight, private and even municipal corporations were tottering, wages were being cut, strikes were breaking out, unemployment was increasing; and nearly all forms of business and financial enterprise were continuing their drop from 1929 standards. The keystone of President Hoover's policy was the Reconstruction Finance Corporation, approved by the Senate in January, 1932. In the first

eleven months of its existence the corporation advanced \$1,650,000,000, principally to banks and railroads; thus the burden of the depression was in great measure being shifted upon the Federal Treasury.

On Feb. 2, President Hoover signed a bill to increase the capitalization of Farm Land Banks by \$125,000,000; on Feb. 27, he signed the Glass-Steagall bill to broaden the acceptance of commercial paper for rediscount by Federal Reserve Banks and to make available for other purposes about \$750,000,000 of the Federal Reserve System's gold supply, which had been used to support the currency—a measure which went far towards bolstering the gold standard; on March 23 he signed the Norris anti-injunction bill which forbade the issue of injunctions against strikers without evidence of damage to the interests of the objects of the strike. The Seventy-second Congress proposed to the legislatures of the several States a 'lame-duck' amendment to the Constitution. (See CONSTITUTION). Dissension arose in Congress and between Congress and the President over measures for unemployment relief. At last, on July 21, President Hoover signed a bill providing for a total expenditure of \$2,122,000,000, of which \$1,800,000,000 was to be loaned to States, municipalities, relief organizations, and self-liquidating projects, and the rest to be spent on Federal public works. In the same month legislation made possible the establishment of twelve Federal Home Loan Banks.

In foreign affairs the Hoover Administration took a strong stand. At the outbreak of fighting between China and Japan in Manchuria the United States warned the two nations, with attention directed especially at Japan, that American rights were not to be tampered with. As an earnest, American marines and the Asiatic fleet were dispatched to the danger zone. At the Geneva Disarmament Conference the United States played an important part. In June, 1932, President Hoover revived its moribund proceedings with a proposal for a one-third reduction in all armaments. In August and September President Hoover conferred with industrial leaders on ways of fighting the depression; a 'share-the-work' movement was inaugurated; a Welfare and Relief Mobilization Conference was opened, with Newton D. Baker as chairman; and on October 16 the President appealed over the radio for local community support for the increased distress in the country. By the end of October all signs pointed towards a great Democratic victory. Twelve million

jobless wanted a change of administration. With nearly 40,000,000 persons voting, Governor Franklin D. Roosevelt of New York was elected thirty-second president by the greatest popular vote in the nation's history to that time. Democrats swept Congressional and local elections as well. Under the circumstances Mr. Hoover was unable to cope with the nation's swiftly accumulating economic problems and the public awaited the inauguration of the President elect.

The dying administration, however, was marked by several major events. During the lame duck session, the last of its kind, the House passed the Senate resolution proposing a Constitutional Amendment, repealing the Eighteenth or Prohibition Amendment. On January 2, 1933, the United States Marines were withdrawn from Nicaragua after six years occupancy and on Feb. 26, the Twentieth Amendment was formally proclaimed. This change advanced Presidential and Vice-Presidential inaugurations from March 4 to January 15 and brought Congress into session on the January 3 following each Congressional election. Came also the first defaults of the war debts. France, Belgium, Poland, Hungary, and Estonia failed to pay and Great Britain, Czechoslovakia, Italy, Lithuania and Latvia indicated strong desires for new terms, lacking which further plans for payment seemed improbable. In the years succeeding, Finland alone of the European nations continued regularly to meet the obligation.

February 15 saw an attempt on the life of President-elect Roosevelt at Miami, Florida. One Giuseppe Zingara, who later said he was motivated by pains in the stomach and hatred of the rich and powerful, fired from a crowd. His bullets struck five persons, including Mayor Anton Cermak of Chicago, who died March 6. Zingara was convicted of murder and sentenced to death.

Three weeks before Mr. Hoover's term expired, a nation-wide banking crisis began in Detroit where the Governor of Michigan declared a banking closure. Panic spread into other states, which in turn closed their banks, and in the morning of Inauguration Day itself, (March 4, 1933) New York and other commonwealths took the same course. The New President took office at a moment of virtually nation-wide suspension not only of all banking but also of all organized stock exchanges and the principal agencies of foreign exchanges as well.

The New Deal—Mr. Roosevelt's own term, for the type of administration he pro-

posed—began at once. In the face of the banking crisis, unemployment and other problems had for the moment to wait. In his inaugural address the President told the nation that the "only thing we need to fear is fear itself", and on March 5, acting under a World War emergency act, he declared a national bank holiday, thereby making the closure uniform throughout the land and providing a breathing spell in which to begin solution of currency and credit problems. Although he called Congress into special session for March 9, the acuteness of the situation demanded immediate action. Credit depended on the immediate reopening of the banks; reopening was hazardous since, before closure, the banks had paid out much of their available currency and their gold reserves had been greatly depleted by withdrawals for private hoarding. In the great cities food supplies were running short in the absence of normal commercial credit facilities. The first Treasury Department order permitted small withdrawals for personal necessities and authorized the printing of clearing house scrip. No scrip was issued, however, because, Congress on March 9 hurriedly passed a bill creating a new currency issue secured by banking assets. An old statute was invoked against gold hoarders and Federal Reserve banks were called upon to supply the names of all persons who had withdrawn metal since February 1.

Public reaction to these moves was favorable and by March 14 great sums of paper currency were re-deposited and enough gold came out of hiding to secure some \$750,000,000 in Federal Reserve Notes. The Act of March 9 also created Federal conservators to safeguard the remaining assets of unsound banks, and within a fortnight probably four out of every five banks in the Federal Reserve system had reopened. State banks were left to the State Governments, most of which modeled their course on the Federal program.

To prevent a second currency exhaustion, Congress entrusted the President with enormous discretionary powers of inflation and also authorized suspension of payments in gold. A flight from the paper dollar resulted, bringing sharp price rises, increasing the demand for inflation, and leading directly to the abandonment of the gold standard. Steps were taken successively requiring the immediate surrender of gold and gold notes for other forms of United States currency, ending payment in gold on all obligations, abolishing gold clauses in public and private contracts,

and authorizing Treasury Department purchases of metals here and abroad, thus purposely depressing the value of the dollar in foreign currencies. Eventually, acting under authority granted him by Congress in May, 1933, the President, on January 31, 1934, reduced the gold value of the dollar to 59.06 cents, in an effort to establish its purchasing power at the levels prevailing in 1926.

Though only a small part of the public understood these moves, the speed and confidence of the Administration almost immediately begat a return of confidence, heightened by the manner in which the New Dealers simultaneously assaulted the problems of unemployment and relief.

On the dates given, Mr. Roosevelt sent Congress a striking series of emergency messages: Federal economies, March 10; legalization of the sale of light beer, March 13; unemployment relief, March 21; farm relief, March 27; regulation of the sale of securities, March 29; relief of owners of mortgaged homes, April 13; development of the Tennessee River Valley, April 10; railroad relief, May 4; and general industrial recovery, May 16.

These proposals constituted the original basis of the New Deal. Many of the ideas were new to the public, to whom they were presented as steps in a planned economy designed to bring about a fuller life for the average man. Only the lapse of considerable time could determine the full value and effect of such proposals and from the beginning many persons of established prominence were outspoken in opposition. Yet the nation as a whole, approving of the President's objectives, appeared eager to try his methods.

Congress followed the Presidential lead with unusual docility, due in part to the absence of attractive counter-proposals in so grave an emergency, and in part to the political astuteness of Mr. Roosevelt, who for many months withheld the distribution of appointive offices within his gift. Thus came swiftly into being the new administrative agencies of the New Deal, created by legislation vesting in the President unparalleled authority over currency and banks; agriculture, railroads and general industry; public works and the relief of the unemployed worker, and of the owner of mortgaged homes and farms.

Of chief importance among the new governmental units thus created were:

NRA.—The National Recovery Administration was advocated by the President as

"machinery necessary for a great cooperative movement throughout all industry in order to obtain unemployment, to shorten the work week, to pay decent wages for the shorter week, and to prevent unfair competition and disastrous over-production". Conditions which were thought to have led to the depression were in future to be curbed, if not eliminated, by putting all industry, with the exception of farming and railroads, under Federal discipline. Through a system of codes and licenses, it was intended to establish within industries a uniformity of practice. The N. R. A. was declared unconstitutional by the U. S. Supreme Court in 1935.

AAA.—The Agricultural Adjustment Administration was charged with authority to restrict production in principal commodities, as cotton, wheat and the like. Growers ordered to curtail their output of raw materials were to be reimbursed by the Government out of funds to be raised by processing taxes on the manufactured article.

FERA.—The Federal Emergency Relief Administration dispensed Federal moneys among the several states, supplementing local poor relief; in some states FERA took over the problem in its entirety. This Administration was later changed to the Works Progress Administration (W. P. A.).

CCC—Civilian Conservation Corps was the name popularly bestowed on the agency legally entitled the Emergency Conservation Work. It was charged with employing great numbers of young men and war veterans under six-month enlistments, in national parks and similar territories, on projects such as reforestation and flood control. This agency was designed to relieve the evils incident to great numbers of the younger unemployed roving the country and drifting into criminal pursuits.

HOLC—Home Owners Loan Corporation belonged to the Federal Home Loan Bank System. The HOLC began with \$2,000,000,000 capital, its function being to trade 4 per cent bonds to the holders of mortgages on urban homes for the mortgages about to be foreclosed. The HOLC, in assuming mortgages, issued new ones for 15 years at 5 per cent.

TVA.—The Tennessee Valley Authority was directed to develop the Tennessee Valley, to operate the hydro-electric plant at Muscle Shoals, and to sell power generated there.

With the creation of these agencies, together with several score others, (see New

Deal Agencies below), the nation found the Federal Government with power to intervene in almost every act of farming, industry and general business. In fact, the Government might accurately be said to be in business itself. Objections that the agencies were unconstitutional were raised almost at once, though the great body of the public appeared ready to cooperate in them and did so to a considerable degree.

NRA began its operations in July, 1933. Under the guidance of General Hugh S. Johnson, it conducted an immense popularization campaign in which an early step was to urge firms to display prominently the Blue Eagle, a device awarded to all employers conforming to preliminary Federal requirements. In general, possession of this insignia indicated that a business had expressed its intention to meet the Federal desires for shorter hours, higher rates of pay and elimination of child labor. The latter evil indeed was all but extinct during the lifetime of the National Recovery Administration. Adoption of the codes for the various industries, slow in the beginning, was later much accelerated. But in several major industries difficulties arose at once and continued to the end.

As part of the general machinery to improve the condition of the worker, the act creating NRA contained the following clause, the much disputed section 7-a:

"Every code of fair competition, agreement and license approved, prescribed or issued under this title shall contain the following conditions: (1) That employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection; (2) That no employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing or assisting a labor organization of his own choosing; and (3) that employers shall comply with the maximum hours of labor, minimum rates of pay, and other conditions of employment approved or prescribed by the President."

Around this section, with its enormous guarantee of freedom to form labor unions, the controversy raged.

Many employers were unwilling to agree

that existing unions represented their employees or to permit the spread of trade unionism under protection of Federal law. This attitude, together with the unwillingness of unionists to tolerate the extension of suspect company unions, resulted in widespread strikes. The steel industry held out against codification; Henry Ford raised wages but would not sign the automobile code, though General Johnson sought unsuccessfully to have the Ford companies barred from Federal contracts. As employers resisted, unionism spread rapidly, and thus, although 229 industries were codified by January 29, 1934, the basic difficulties were still unsettled as 1933 drew to a close. In the uncertainty, re-employment lagged and there was great pressure on the President to render a decisive interpretation of the disputed section, but he forebore, probably advised that the code system had little likelihood of obtaining Supreme Court approval and that NRA with its broad blanketing provisions would have to be replaced by fresh legislation. NRA was declared unconstitutional in 1935.

For all of this, business improved materially and the New Deal broke down other obstacles to national recovery on many fronts. The AAA, with a drought aiding, curtailed farm production and raised prices, reimbursing curtailed growers out of the processing taxes. Though the drought and an unforeseen lump in prices brought fresh difficulties, farmers were tided over by fresh loans. PWA made enormous grants of funds to Federal units, States and municipalities for great public works throughout the country, and when local problems delayed the start of these undertakings, a temporary agency, the Civil Works Administration, came into being. By the device of "making work", CWA in a short time had 4,000,000 persons on its payroll, while by July 1, 1933, there were 1,000,000 youths and war veterans employed by CCC.

It all cost a great deal of money. In a single fiscal year benefits to farmers totalled \$280,000,000; the Reconstruction Finance Corporation paid out \$1,178,000,000; \$716,000,000 was spent by CWA; \$779,000,000 went for direct relief of the poor and \$645,000,000 for special public works designed to give employment. Yet in spite of a national deficit of nearly four billions of dollars, the great expenditures were considered justified by the improvement in public morale and the abatement of panic psychology.

Early in 1934 NRA lost some of its attrac-

tiveness to labor because the Federal Government appeared insufficiently pro-union in its application of section 7-a. As the year went on NRA was considerably amended in ways designed to smooth its operation. Financial aid to distressed persons was much extended and in many strikes participants were regarded by FERA as needy unemployed. At the same time the administration made strong efforts to have the States, wherever able, take over the problems of relief.

But while conservative business had considerable success in opposing the operation of NRA, the New Deal pushed onward in other directions. The Civilian Conservation Corps proving successful, the President directed it to continue and enlarged its scope. The Home Owners Loan Corporation made public figures indicating that it had refinanced mortgages on 36,310 homes in its first year. Broadening the bases of the New Deal, the administration advanced old age pensions for railroad workers, unemployment insurance, and Federal control of stock exchanges.

The Securities Exchange Commission came into being on June 30, a body of five appointed by the President to exercise regulatory powers over the sale of securities. All exchanges were required to obtain licenses and to register all securities with the commission. Dealers and brokers functions were delimited and by a variety of means including the stiffening margin requirements, the Securities Exchange Act sought to eliminate unwise speculation and to safeguard investments generally.

Opposition to the President took two clearly developed forms. One group opposed his program as socialistic, if not Russian, and consequently a menace to free institutions. Among persons of wealth there was a seeming tendency during 1932 to hold back recovery for the sake of discrediting the President in the approaching Congressional elections. The extreme left interpreted the behavior of the conservatives as positive indication that the Presidential program was ineffective because too conservative. Meanwhile, the President, in his public addresses, re-emphasized that he was working within the American philosophy to save the American system.

The Republican party sought to make "domination by an all-powerful central-government the chief issue of the November congressional elections. The voters were told that "a small group in Washington" was "seeking covertly to alter the frame work of

American institutions." Ex-President Hoover strongly indorsed this point of view, but popular feeling ran high in Mr. Roosevelt's favor. In 35 contests for Senate seats in 32 states, there were elected 26 Democrats, 7 Republicans, 1 Farmer-Labor, 1 Progressive, a definite gain for the Democrats of 9 seats and a loss to the Republicans of 10. In the house, where the entire membership was elected, the Democrats won 322 seats as against 309 in the preceding Congress, and Republican representation was cut from 113 to 103. On the first nationwide referendum, the nation had endorsed the New Deal.

Nevertheless, the extreme conservatives continued in bitter opposition and the agitation on the left was materially increased by the Rev. Charles E. Coughlin, a Roman Catholic priest from Detroit, and by Huey Long, Senator from Louisiana. Father Coughlin, building up a large radio following, began by praising the President, but eventually criticized him with such violence that the Roman Catholic hierarchy was at some pains to point out that he did not represent it. (After a visit to the Vatican in 1936 the "radio priest" who had sponsored a third party dropped out of politics.) Senator Long, persuasively arguing that "we ought to share our wealth" and "make every man a king" won a wide following in the Southern states till his career was terminated by the fatal bullet of a political enemy (September, 1935).

The Supreme Court, however, not the Republicans or the leftists, dealt the New Deal its hardest blows.

The first major ruling of the highest court in 1935 was a victory for the New Deal. In a series of decisions handed down on February 18, the court upheld the government in four cases arising out of the abandonment of payment in gold. The effects of the decision were five-fold:

- (1) to disallow all demands for payment either in gold coin or in paper dollars of equivalent gold values under private and State contracts of indebtedness.
- (2) to disallow all such claims based on the Government's calling in of all gold certificates.
- (3) to non-suit certain claims for gold payments on Federal pledges of credit.
- (4) to overthrow the doctrine that Congress had authority to repudiate the United States' pledge of its credit.
- (5) to leave open a possibility for recovering claims under other economic conditions or by some other form of suit.

This administration victory was quickly overshadowed by subsequent decisions, the most sweeping of which was the invalidation of the National Recovery Act.

As early as January 7, with Justice Cardozo alone dissenting, the Court held that a section of the petroleum code empowering the President to prohibit transportation of petroleum out of a state, was an unconstitutional delegation of power. On May 27, in the case of the United States vs. Schechter, involving live poultry, the court unanimously held all codes under NRA invalid, and for two reasons:

(1) the code making authority was an unconstitutional grant of power in that it gave the President lawmaking authority.

(2) attempts to fix wages and hours of intrastate employment by codes exceeded the Federal power to regulate commerce within a State, since Federal authority could regulate commerce within a state only as far as such commerce affected interstate commerce directly.

The Administration moved at once to repair the damage. On July 5, President Roosevelt signed the Wagner Labor Relations Act, designed to restore to labor the rights stipulated in the now dead section 7-a. The act declared that the policy of the United States was to encourage collective bargaining and to protect employees in freely organizing and in negotiating through representatives of its own choosing. It created a National Labor Relations Board empowered to stop unfair practices by employers, to issue subpoenas, and to call upon any Federal court of appeals to enforce its orders. Specifically it stated that nothing in its provisions was to interfere with the right of the employee to strike. In addition, for the soft coal industry, Congress passed the Guffey Act designed for the protection of labor in the mines.

Meanwhile the Supreme Court went on to declare unconstitutional a farm mortgage moratorium which had been intended to prevent farm foreclosures; to decide against the President in the case of the removal of a Federal Trade Commissioner before expiration of his term of office; and to kill railroad old age pensions by a vote of five to four.

The railroad pension decision was written by Justice Roberts and concurred in by Sutherland, McReynolds, Van Devanter and Butler. It took the position that the law imposed the burdens on the railroads not for any purpose of controlling interstate commerce but "purely for social ends" which lay "outside

the orbit of Congressional power." The minority opinion written by Chief Justice Hughes and concurred in by Brandeis, Stone and Cardozo vigorously dissented and the public began to perceive clearly a great difference of viewpoint between the conservatives and liberals of the court.

Indicating publicly that the New Deal had only begun its battle, President Roosevelt continued expanding the agencies untouched by the court and pressing for social legislation in additional fields. He empowered the PWA to sell in the open market the securities it had received from States and municipalities in return for its loans. Such securities sale resulted in fresh funds for PWA and enlarged its capacity to finance employment. Federal unemployment relief was considerably improved by the substitution of the Works Progress Administration (WPA) for the Federal Emergency Relief Administration, a change which in effect substituted employment for direct relief. Employable persons receiving relief funds were given work on "small but useful projects" under the new organization. Thus were direct doles materially reduced. Salary schedules, based on the grade of work performed and general living conditions in the several sections of the country, ranged from \$94 a month for professional work in New York City to \$19 a month for unskilled farmhands in Southern states. The problem of keeping WPA wages from breaking down wage scales prevailing in the various trades was met by regulating the number of hours a WPA worker was to be employed each month. Carpenters on WPA jobs, for example, were paid at the hourly rate prevailing on labor union jobs, but were employed only sufficient hours to earn the monthly wage fixed for the type of work in that area.

On August 14 the President signed the Social Security Act. Here again was legislation of such sort that only the passing of several generations could make possible a true evaluation, but its immediate implications were such as to cause it to be regarded as perhaps the most outstanding item in the New Deal program. It had manifold purposes. It called into being, in cooperation with the States, pension systems for the needy aged and for the temporarily unemployed. It provided Federal supplements for State aid for needy dependent children, the mothers of such children, and crippled children; for vocational rehabilitation of the disabled; for health agencies generally; and for the blind. For

the needy aged, the Federal government was to add, up to \$15 a month, a sum equal to the pension granted by the State. In addition the act called into being a nationwide old age benefit system for almost all persons, save farmers, domestics, teachers and government employees. It levied a special income tax on employed persons and an equal sum on their employers, starting in 1937 at one percent of the income and rising by steps to three percent. Out of the fund thus raised, pensions would become payable after January 1, 1942, to all unemployed persons participating in the system and attaining, then or thereafter, the age of 65. Under this program, pensions were calculated to range from \$10 to \$85 a month, according to earnings and term of employment. Millions of persons contemplating reasonably steady employment, foresaw comfortable retirement in their declining years.

Other steps taken by the administration in 1935 included amendments to the TVA act authorizing the Tennessee Valley Authority to sell electric current; the vesting in the Interstate Commerce Commission of fuller authority over air mail; abolition by law of public utility holding companies, which was hotly contested by critics of the NEW DEAL; and a considerable raising of taxes on large incomes, the rates under the new schedule ranging from 31 per cent of all net income in excess of \$50,000 per annum, to 75 per cent on all net income in excess of \$5,000,000.

But early months of 1936 saw still more of the New Deal structure swept away by decisions of the Supreme Court. By a vote of 6 to 3, the AAA was outlawed. Justice Roberts, in the majority opinion, held (1) that the processing taxes out of which farmers had been reimbursed were unconstitutional and (2) that Congress had no authority under the welfare clause of the Constitution to regulate agricultural production. By 6 to 3, Chief Justice Hughes with the majority, the Court threw out the wages and hours provisions of the Bituminous Coal Stabilization (Guffey) Act, and by 5 to 4, Hughes with the minority, declared unconstitutional the price fixing sections of that measure. A law which had been passed in 1933 to give municipalities the right to discharge debts as bankrupts in the Federal Courts was killed also by a vote of 5 to 4. And again by 5-4, an act passed in New York State fixing minimum wages and hours for women workers in that state was declared unconstitutional. This latter decision though not affecting the national administration, served once more to emphasize the sharp

division of the court on current social problems. TVA, however, was upheld, McReynolds dissenting, in its construction of Wilson Dam and its contract to purchase power transmission lines. However, since many issues affecting TVA as a whole were excluded, the decision did not constitute full validation of the entire enterprise.

These decisions served to intensify public interest in the approaching Presidential election when obviously the chief issue was to be whether or not the nation desired continuance of Mr. Roosevelt's policies. Meanwhile, Federal disbursements continued to increase, jumping \$4,000,000,000 in twelve months. Half of this increase was caused by the payment of World War I veterans bonus in advance of the stipulated year (1945), a matter wherein Congress heavily overrode the President's veto under pressure by the veterans' lobby. Other minority groups, however, abated their pressure on the administration, notably the farmers and organized labor. Agricultural prices were up and unionism was busied in a spirited struggle between the American Federation of Labor and the Committee for Industrial Organization, headed by John L. Lewis. The Lewis group, seeking to organize labor on industrial rather than craft lines, threw down the gage to the A. F. of L. by demanding a concerted drive for the organization of the steel industry. In August, 1936, the Federation suspended ten large unions adhering to the C. I. O. and thereafter the cleavage in the ranks of labor developed rapidly. It was the first major split in organized labor in the United States in fifty years. Both sides, however, remained strong supporters of the administration in the ensuing Presidential campaign.

Because invalidation of the AAA processing taxes lost to the government much expected revenue and because the prepayment of the soldiers' bonus had created a \$2,000,000,000 drain on Federal finances, President Roosevelt urged Congress to pass additional taxation. The result was a new device, the taxing of corporations mainly on surpluses earned but not distributed within a given year. The proposal was strenuously opposed by those who contended that such distribution would damage the soundness of large companies. On the other hand, congressional enactment of the tax was applauded by many who believed that "big business" had been retarding recovery by hoarding funds, and that national prosperity would be enhanced by compulsory expenditure of accumulated assets.

Early in 1936 a Senate committee had investigated dealings in war munitions, inquiring into the transactions of J. P. Morgan and Company on behalf of Great Britain and France during World War I, and with Germany prior to American entry into the conflict. Much material was submitted in support of the thesis that the United States had been led into war to aid munitions dealers and manufacturers. The committee urged a stringent neutrality law to prevent American business from involving the United States in the wars of other nations, and on February 29 the President signed a Neutrality Act. This law went considerably farther than any previous measure, forbidding loans and credit to nations at war, though giving the President discretion to allow commercial credits for "lawful exports". The measure, however, was a compromise and its supporters and critics were alike unsure what effects it might have when the time came to apply it.

The great political conventions came in June. At Chicago, the Republicans on the first ballot named Governor Alfred M. Landon of Kansas and Frank Knox of Illinois. Mr. Landon made his campaign on issues enunciated in his party platform, which alleged that Mr. Roosevelt had usurped rights reserved to the states and the people, had flouted the authority of the Supreme Court, had repudiated the country's financial obligations, and had coerced and intimidated voters by withholding relief. Conservative Democrats, including John W. Davis and Alfred E. Smith, presidential candidates in 1924 and 1928, and a group of men of considerable wealth, assisted Mr. Landon in his efforts.

The Philadelphia convention which renominated Mr. Roosevelt by acclamation also brought about an important reform in party procedure. The old rule of the party requiring a vote of two-thirds of the delegates for Presidential nomination was abolished, thus terminating, as of the convention of 1940, the great power long wielded by the Southern bloc in Democratic affairs and in effect cancelling long-standing contentions that the Democratic party was essentially a sectional organization.

Beginning his formal campaign on October 9, and making nine speeches in all, including one from the White House the night before election, Mr. Roosevelt informed the country that the New Deal would go on; that his second administration would have the same objectives as his first; and that for those objectives his party had "just begun to fight."

Recalling the condition of the country on the day he took office, he pointed out that "today for the first time in seven years, the banker, the storekeeper, the industrialist and small company owner can enjoy the company of their ledgers." This business recovery he ascribed to "a sound money policy which raised prices"; and to those who charged him with either Communism or autocracy, he replied that his administration had saved the whole private profit system by dragging it "back from the pit it had fallen into in 1933."

The closing days of the campaign saw a determined effort by certain Republican politicians to represent the Social Security Act, first payments under which were then imminent, as a gigantic tax on salaries, levied by the administration to meet the extravagances of the New Deal. This contention, patently false and easily answered, was believed to have reacted very unfavorably on Mr. Landon's chances.

An unprecedented number, 45,650,000 persons, voted on Election Day. President Roosevelt was re-elected by a new record-breaking margin. His popular plurality over Gov. Landon was more than 11,000,000, being 4,000,000 more than his margin of victory over Mr. Hoover in 1932. With the exception of Maine and Vermont, every State gave him its electoral vote. The already strong Democratic hold on the Senate was increased by five seats to a total of 75, leaving the Republicans but 17. In the House of Representatives the number of Democrats was increased from 308 to 335; and Republican strength fell from 100 to 88. Never before in the history of the nation had an administration won so widespread a popular endorsement.

Though the nation had given the New Deal its approval, the fact remained that the Supreme Court had outlawed many of the New Deal's measures. In 1935 and 1936 there had been repeated agitation for several proposals designed to bring the court more into line with the popular will. Much was made of the fact that five men, a court majority, could block the desires of millions of their countrymen. In rebuttal, it was argued that at least one of the functions of the court was to ensure minorities full protection under the law, and to keep the national policies within traditional American lines. Several forms of Constitutional amendment were advocated, but early in his second term, Mr. Roosevelt sought to effect a speedier change.

In his annual message to the Congress in

January, 1937, he called for a more liberal interpretation of the Constitution as prerequisite for successful democracy and on February 6 he transmitted the historic message which was to engage the attention of the Senate for half a year. In substance, the President contended that old age begets inability to meet changing conditions; and that a judiciary, even more than other agencies of government, required flexibility of mind and understanding of current situations. Consequently, he proposed that when a Federal judge attained the age of seventy, and did not retire, the President be authorized to appoint an additional judge to that court. Though the program applied to all Federal Courts, its application to the Supreme Court excited most immediate controversy. The proposed plan limited the number of Supreme Court Justices to fifteen; but since six of the sitting members of the tribunal were already above the proposed replacement age, objectors immediately contended that the President sought to pack the highest bench in the land with men of his own choosing.

While the controversy raged, Congress enacted a law permitting retirement of Supreme Court Justices on life pensions equal to full salary. Justice Van Devanter, a conservative member, was the first to retire on those terms. Also during the Senate debate on the President's proposal, there appeared to be a change in the attitude of the court, chiefly due to the fact that Justice Roberts, who had voted with the conservatives on several 5 to 4 decisions, now inclined toward the liberal view, resulting in 5 to 4 decisions sustaining the Administration.

Those favoring the Roosevelt proposals emphasized the fact that Justice Roberts's vote alone had turned the scale. Opponents of the President's judiciary plan maintained that the new decisions had disproved his contention that the court was not in step with the times. A majority of the Senators believed the Administration bill unpopular and for the first time, the President was sharply criticized by a considerable number of his own party in the Senate. The court bill was killed by being sent back to the judiciary committee.

The partial recovery from depression during 1934-5-6, was decisively checked early in 1937 by strikes in the automobile, steel and other industries. Inspired by the National Labor Relations Act and by the Administration's attitude, labor union leaders succeeded in calling strikes that directly and indirectly stopped employment of millions of people,

causing reduction of buying power, followed by curtailment of manufacturing orders and general recession of business. The first half of the year 1938 found Congress busily working on bills to carry out the President's recommendations to speed up the spending and loaning of public moneys, with prospect that the national debt of nearly \$40,000,000,000 would be increased by about \$5,000,000,000 during the year.

As it became obvious during 1939 that Europe was bound to plunge into war within a few months great attention was given to defense, esp. airplanes, and some 9000 additional planes were authorized for the army and navy. When war finally broke out in Sept., 1939, the president was compelled to announce an embargo on munitions or war materials of any sort to belligerents. In Nov. 1940 Pres. Roosevelt smashed another old tradition by winning reelection for a third term, the first in the history of the nation. His opponent was Wendell L. Willkie of New York, a native of Indiana. For the next year the entire resources of the nation were devoted to construction of war supplies for those nations fighting Germany and for national defense.

The U. S. became embroiled in World War II Dec. 7, 1941, when Japan, without warning, attacked Pearl Harbor, Hawaii, causing much damage and loss of life. The following day war was declared on Japan and two days later against Germany and Italy. Japan immediately assaulted the Philippine Islands and several small U. S. islands in the Pacific. By Feb. 1, 1942, the Japanese had captured Guam and Wake Islands and all of the Philippine archipelago, including Manila, except for a small area on Luzon where a combined U. S. and Filipino force held out bravely, though outnumbered. May 6 American resistance ended in the Philippines. The coming of war molded the nation into a solid, cohesive unit, the isolationists, who were so active in the pre-war period, became a small minority after Dec. 7. Pres. Roosevelt announced in Jan. 1942 that U. S. troops would be sent wherever there was fighting and on Jan. 30, 1942, the first A. E. F. since 1918 landed in Northern Ireland. The U. S. navy and airforce was active in the Pacific in the months following Japan's attack and lashed savagely at enemy island bases and convoys. June 11, announcement was made of a lend-lease agreement between the U. S. and Russia. By Dec., 1942, the U. S. had sent 1,000,000 men overseas.

In 1943 the publication of Wendell Willkie's *One World* had a positive effect in combating isolationism. The conferences at Casablanca, Cairo and Teheran emphasized in particular the unalterable 'unconditional surrender' policy of the Allies. Lend-lease became a huge system, and in 1943 American shipments amounted to 14 billion dollars. Gen. MacArthur's campaign in the South Sea Islands was well under way.

In June 1944 began the invasion of Europe and before the final stage of the year Germany was confined within the fatherland, encircled by Allied forces. MacArthur was approaching the Philippines, and the battle of Leyte ended the Japanese naval threat. The political campaign resulted in the election of F. D. Roosevelt for a fourth term.

In 1945 the Yalta Conference outlined the plans for the final stages of the war. Our armies joined the British in crossing the Rhine and uniting with the Russians before Berlin; in the Pacific area Gen. MacArthur re-entered Manila and in conjunction with Admiral Nimitz led the victorious forces to the shores of Japan. Germany surrendered May 8 and Japan Sept. 2.

The entire world was saddened by the death of President Roosevelt on Apr. 12. Harry S. Truman, the Vice-President, succeeded Roosevelt.

The World Security Conference was held in San Francisco in April and May and formulated the United Nations Charter. In July Truman, Churchill and Stalin met at Potsdam, Germany.

United Nations Conferences

Casablanca Conference. A conference held at Casablanca, French Morocco, Jan. 14-24, 1943, during which President F. D. Roosevelt and Prime Minister Churchill planned the invasion of Sicily and the attack on the Italian mainland.

Moscow Conference. Oct. 19-30, 1943, a Conference of Foreign Secretaries met at Moscow to discuss the problems of the war and the peace: Cordell Hull for the U. S. A., Anthony Eden for the United Kingdom, and V. M. Molotov for the Soviet Union. Discussions centered around measures to be taken to shorten the war in Europe against the Axis Powers; the setting up of machinery for insuring close cooperation among the three Governments concerning European questions that arise as the war develops; the continuation of close cooperation into the period following the end of hostilities; the inclusion of

all peace-loving nations, great and small, in a broad system of international cooperation and security; and the punishment of those Nazis guilty of perpetrating atrocities and executions in countries overrun by German forces.

Cairo Conference. President Franklin D. Roosevelt, Prime Minister Winston Churchill, and Generalissimo Chiang Kai-shek met at Cairo in N. Africa Nov. 22-26, 1943. After their meeting this communique was issued:

'The several military missions have agreed upon future military operations against Japan.

'The three great Allies expressed their resolve to bring unrelenting pressure against their brutal enemies by sea, land and air. This pressure is already rising.

'The three great Allies are fighting this war to restrain and punish the aggression of Japan.

'They covet no gain for themselves and have no thought of territorial expansion.

'It is their purpose that Japan shall be stripped of all the islands in the Pacific which she has seized or occupied since the beginning of the first World War in 1914, and that all the territories Japan has stolen from the Chinese, such as Manchuria, Formosa, and the Pescadores, shall be restored to the Republic of China.

'Japan will also be expelled from all other territories which she has taken by violence and greed.

'The aforesaid three great powers, mindful of the enslavement of the people of Korea, are determined that in due course Korea shall become free and independent.

'With these objects in view, the three Allies, in harmony with those of the United Nations at war with Japan, will continue to persevere in the serious and prolonged operations necessary to procure the unconditional surrender of Japan.'

Teheran Conference. Prime Minister Churchill, Premier Stalin, and President Roosevelt met in Teheran, Iran, Nov. 26-Dec. 2, 1943; they issued the following declaration on the results of the conference:

'We, . . . express our determination that our nations shall work together in the war and in the peace that will follow.

'As to the war, our military staffs have joined in our round-table discussions and we have concerted our plans for the destruction of the German forces. We have reached complete agreement as to the scope and timing of operations which will be undertaken from the east, west and south. The common understanding which we have here reached guarantees that victory will be ours.

'And as to the peace, we are sure that our concord will make it an enduring peace. We recognize fully the supreme responsibility resting upon us and all the United Nations to make a peace which will command good will from the overwhelming masses of the peoples of the world and banish the scourge and terror of war for many generations.

'With our diplomatic advisers we have surveyed the problems of the future. We shall seek the co-operation and active participation of all nations, large and small, whose peoples in heart and in mind are dedicated, as are our own peoples, to the elimination of tyranny and slavery, oppression and intolerance. We will welcome them as they may choose to come into the world family of democratic nations.

'No power on earth can prevent our destroying the German armies by land, their U-boats by sea, and their war plants from the air. Our attacks will be relentless and increasing.

'Emerging from these friendly conferences we look with confidence to the day when all the peoples of the world may live free lives untouched by tyranny and according to their varying desires and their own consciences.'

'We came here with hope and determination. We leave here friends in fact, in spirit, and in purpose.'

'Signed at Teheran, Dec. 1, 1943.'

ROOSEVELT, STALIN, CHURCHILL.'

International (World) Bank, July, 1944, an international monetary conference was held at Bretton Woods, N. H., with representatives of 44 nations and of the Fr. Committee of National Liberation present, to discuss (1) the creation of a world bank for reconstruction and development, and (2) the establishment of an international monetary fund. An international bank would be concerned with capital transfers, and through it member countries might obtain long-term loans. Its initial capital would be 10 billion dollars, of which the U. S. would put up 3¼ billions and Gr. Brit. one billion. The stabilization fund would be confined to currency operations and Allied relief needs after the war. The first loan was made to France in 1947.

Dumbarton Oaks Conference, a meeting of representatives of the United States, Gr. Br., Russia and China held at estate known as Dumbarton Oaks in Washington, D. C., recommending, upon its termination on Oct. 9, 1944, creation of The United Nations, an international security organization; this body to have authority 'to take such action by air, naval or land forces as may be necessary to maintain or restore international peace and security.' The United Nations charter, as planned, established: (1) a General Assembly to include all peace-loving nations; (2) an eleven-member Security Council (permanent members U. S., Gr. Br., Russ., China, and eventually France, with others added for a two-year term by a two-thirds vote of those named) responsible for maintenance of peace by economic, military or arbitrational methods, and having at its disposal military forces supplied by member nations of the Assembly; (3) an Economic and Social Council to act on international humanitarian problems; (4) a world court having authority to summon member United Nations to blockade or apply diplomatic, economic or actual military force where needed; strategic direction of these forces under staff representatives from permanent members. The proposed document required a two-thirds majority of the General Assembly for a decision, while directing problems requiring action to the Security Council. Promotion of respect for fundamental human liberties and solution of economic and social problems was reserved for the 18 member nations of the Economic and Social Council.

None of the work of the conference was decisive, the representatives merely drafting a tentative plan to be considered further by leaders of prospective United Nations. This proposed charter served as the basis of discussion and action at the San Francisco Conference, 1945.

Crimea Conference, held in Yalta, in the Crimea, in February, 1945, with Roosevelt, Churchill and Stalin in attendance. A secret agreement was signed on Feb. 11, but the terms were not publicly revealed until later. However, at the end of the sessions there was published a statement in which these agreements were reached:

1. An agreement on plans for enforcing the unconditional surrender of Germany.

2. The forces of the three powers will each occupy a separate zone. Co-ordinated administration and control has been provided for.

3. All German armed forces are to be disarmed and disbanded, the German general staff broken up, all military equipment removed or destroyed, such German industry as could be used for military production either limited or controlled, all war criminals brought to just and swift punishment, the Nazi Party wiped out, and the establishment of a commission for the compensation of damage.

4. A United Nations conference is to be held at San Francisco in April, to prepare a charter for the organization.

5. A commission is to visit Poland for the purpose of conferring with Polish leaders, in an effort to achieve a Government of national unity.

The Yalta secret agreements included these:

1. In two or three months after Germany has surrendered the Soviet Union will enter into the war against Japan on the side of the Allies, on condition that the status quo in Outer Mongolia be preserved, the former rights of Russia violated by the treacherous attack of Japan in 1904 be restored, and the Kurile Islands be handed over to the Soviet Union.

2. The internationalization of Darien.

3. The restoration of Port Arthur as a leased naval base.

4. The joint Chinese-Russian operation of the Chinese Eastern Railroad and the South Manchurian Railroad.

5. The United States and Great Britain are to return as deserters from the Red Army those nationals of present Soviet territory who fought in the Axis armies.

San Francisco Conference, a United Nations Conference to draw up a covenant for a new league of nations met at San Francisco, April 25-June 6, 1945; was attended by delegates of 46 nations. U. S. Secy. of State Stettinius presided. The series of proposals issued at the **Dumbarton Oaks Conference** were presented; many amendments were proposed. Amendments written into the proposals provided that justice, international law, equal rights and fundamental freedoms would be the basis for action by the new world organization; interference by the organization in essentially domestic affairs was barred; a new world court was planned; the framework for a trusteeship for colonial peoples was provided; the six, non-permanent seats on the Security Council were allotted, based both on the contribution to peace and on equitable geographical distribution; the responsibility of the Security Council to the Gen. Assembly was increased over the Dumbarton Oaks proposals. It was ruled that the Security Council could provide that the new charter take effect when ratified by all the big powers and a majority of the small ones.

Potsdam Conference, held in Potsdam, Ger., beginning July 17, 1945; attended by Truman, Churchill and Stalin. On July 28 the new Br. Prime Minister, Clement Attlee, replaced Churchill. In the communiqué issued following the meeting, from which all reporters were barred, Allied terms were handed down to Ger.: All Ger. armed forces abolished; all armament, aircraft, shipbuilding industries prohibited, education put under control of Allies, trial and punishment of war criminals, abolition of Naziism and its institutions, revision of Ger. judicial system. Industrial equipment and external assets were divided between the Allies. It was announced that a council of foreign ministers representing the U. S., Br., Russ., France and China would be created and would hold its first meeting in London, Sept. 1945, to continue work for the peace settlements. A clarification of surrender demands in the form of the **Potsdam Declaration** was offered to Japan by the U. S., Br. and China stating that a defeated Japan would have no war industries, a government free of militarists, her four main islands and smaller ones allowed by the Allies, occupation at 'points designated by the Allies.'

Truman Administration. On Aug. 6, 1945, an atomic bomb was released on Hiroshima, and on Aug. 8 another on Naga-

saki, following which Japan's surrender was signed, Sept. 2, on the battleship Missouri. The conference of foreign ministers in London ended with no action on treaties. At the same time Pres. Truman issued a declaration that the industrial secrets of the atomic bomb would not be shared with other nations. In November, 28 nations ratified the Bretton Woods trade and currency plan. On the domestic front rationing was generally discontinued.

The year 1946 was one of industrial unrest and increased tension in foreign affairs. In January began the strike of U. S. Steel workers, the greatest strike in history, ending in February with a wage increase of 18½ cents an hour. In April the General Assembly of the United Nations voted to use the N. Y. City Building on the World's Fair grounds at Flushing, Long Island, as temporary headquarters. In May a nation-wide railroad strike was brought to an end in two days by government intervention. In the same month a soft-coal strike led to government seizure of the mines. While a later strike, in November, of the soft-coal miners was in progress, the union leader, John L. Lewis, was given a court fine of \$10,000 for contempt of court. A union fine of \$3,500,000 for the same offence was later reduced by the Supreme Court to \$700,000. On June 30 came the expiration of the OPA, and no action as to price control. In July a compromise bill, reestablishing OPA for a year, was enacted, but by the end of the year all price controls had been dropped, except on rents, sugar and rice. July 4 marked the birth of the Philippine Republic. During 1946 the United States and Great Britain became closer in their agreement as to a firm attitude toward communist Russia.

At the opening of 1947 James F. Byrnes resigned as Secretary of State, and Gen. George C. Marshall was appointed successor. The year brought vital action in meeting the labor situation. The "portal to portal" suits, upheld by the Supreme Court, passed the 4-billion mark, but after government intervention the suits were dropped. The situation was climaxed by the passage of the Taft-Hartley Bill, in June. See LABOR LEGISLATION. This law met with much union opposition. In a speech at Harvard, in June, Secretary Marshall suggested a plan for European aid; he declared "there must be some agreement among the countries of Europe as to the requirements of the situation and the part these countries themselves will take in order to give

proper effect to whatever action might be undertaken by this Government." In July was enacted a new law regarding Presidential succession. With no Vice President the order of succession is: House Speaker, Senate President pro tempore, and the Cabinet members in regular succession. Another law in the same month unified the Army and Navy, regrouping the armed forces into a National Security Organization under a single Cabinet Secretary of National Security. New York had been selected as permanent United Nations headquarters, and John D. Rockefeller, Jr.'s gift of \$8,500,000 accepted.

In 1948 the U. S. assumed a world role for the first time in its history. The Marshall Plan was placed in operation with good results. The 'cold war' with Soviet Russia centered in Berlin with a blockade of outside surface transportation which was overcome by an Allied airlift. Employment in U. S. reached a record height, salaries soared, as did commodity prices and rents. The largest crops in history were harvested. This year saw the advent of supersonic planes and the acceptance of television in the home. The yr. was marked by an unusual presidential election. A 'progressive' third-party movement was led by former vice-pres. Henry A. Wallace and the election of Thos. E. Dewey, Gov. of N. Y. was predicted. The election of Pres. Truman and a Dem. majority in both houses of Congress was a stunning surprise. It proved that the New Deal had not died with F. D. Roosevelt. After the election the White House was closed for reconstruction.

Early in 1949 Secy. of State Geo. C. Marshall resigned because of poor health, and Dean Acheson was apptd. in his place. Unemployment rose progressively and in June reached a 7-yr. peak. The price of foods, apparel, etc., dropped from the 1948 high. On Feb. 25 a U. S. Navy flying boat carried 222 passengers in Calif., to set a new record and on Mar. 4 the same ship carried 269 persons, the greatest number carried by any type of aircraft. On Mar. 2 an Air Force bomber, *Lucky Lady*, completed the first non-stop flight around the world. J. V. Forrestal retired as Secy. of Defense in Mar. and in May committed suicide. The yr. saw 3 trials of Communists: a group of 11, Judith Coplon, and Alger Hiss. July 21 the N. Atl. Defense Pact was signed.

In Jan. of 1950 Pres. Truman decided on

the making of the hydrogen bomb, said to be 1,000 x more powerful than the atom bomb. Hungarian consulates in U. S. were closed in retali. for arrest of Robt. A. Vogeler, Am. business man charged with spying (released Apr. 1951). In May the U. S. and Allies protested Rus. org. of Ger. militia in E. Ger. and in Sept. Eng., Fr., U. S. agreed to provide W. Ger. defense. Oct. of 1954 15 nations signed agreement to sovereignty and armament of W. Ger. Pres. Truman sent **air and sea aid to S. Korea** in June. In Aug. U. S. citizenship was granted to Guam. An attempt on the life of Pres. Truman was made by two fanatic Puerto Ricans Nov. 1. In Dec. Pres. Truman called for 'united effort' to withstand Com. aggression and Dwight D. Eisenhower was named Supreme Comdr. of N. Atlantic Treaty Forces in Europe. On Dec. 24, under pressure of Chinese Red drive, UN Korean forces were forced to evacuate Hungnam.

In Jan. 1951, UN Korean peace appeal was rejected by Red China. On 9th. Post Office United Nations, N. Y. was opened, and Jan. 11 Pres. Truman decl. constitutional right to send troops abroad and 'Great Debate' resulted in approval by Cong. Gen. Eisenhower, now SHAPE comdr., asked Eur. nations to consider political and economic unity. In Feb. the UN condemned Red China as aggressor in Korean war. The **22d amendment to the Constitution, limiting U. S. presidents to 2 terms**, was adopted Feb. 26. In Apr. Pres. Truman removed Gen. MacArthur from all command in Korea. Mar. 28-Apr. 4 Pres. of France, Vincent Auriol, made official visit to U. S., first by any Fr. pres. in office. In Apr. U. S. denounced sentence for spying of A.P. Wm. A. Oatis by Czechoslovakia and enacted economic reprisals. On Apr. 27 Denmark and U. S. signed Greenland joint defense pact for duration of N. Atl. Treaty and in Aug. U. S. and Israel signed treaty of frdshp. and commerce. On Sept. 8 **Jap. Peace Treaty was signed** by U. S. and 48 other nations. Oct. 10 Mutual Security Law was signed by Pres. Truman. War between U. S. and Germany was formally ended Oct. 19. On Oct. 20 Gen. Mark W. Clark was nom. U. S. amb. to Vatican, resuming relations ended in 1868, but withdrew at protest of the Church Congress. Oct. 31 Princess Elizabeth of Eng. and husband Duke of Edinburgh visited Pres. Truman in Wash. The Communist party

was banned from ballot by Mass. legislature in Nov.

On Jan. 8, **1952**, U. S. signed agreement with Yugoslavia (1st. with a Com. regime) for that country's econom. stability in return for Mutual Security Aid. A tax rise of \$10 billions was asked by Pres. Truman on Jan. 21. In Feb. \$478 m. of Mutual Security Fund was diverted to economic aid for Gr. Brit. Mar. 20 Senate ratified Japanese peace treaty and approved security pacts with Japan, Philippines, Austria, New Zealand. March 23 four million dollars in aid to Iron Curtain 'escapees' was allocated. On Apr. 2 Queen Juliana of Netherlands and husband Prince Bernard paid state visit to U. S. July 14 keel of first atomic submarine was dedicated. July 25 Puerto Rico became first overseas U. S. commonwealth. Sept. 27 U. S. and Denmark reported constr. of Greenland strategic air base. On Nov. 4 **Gen. Eisenhower was elected 34th. U. S. president.** Nov. 12 U. S.-Jap. lend-lease agreement signed. Dec. 24 McCarran-Walter Immigration Act went into effect.

On Jan. 6, **1953**, Prime Min. Winston Churchill visited Pres. Truman in Wash. Pres. Eisenhower announced the deneutralization of Formosa on Feb. 2. On May 15 Czech. pardoned Wm. A. Oatis in return for lifting of trade and travel restr. May 22 title to submerged coastal lands was given to states. On July 27 UN and Communist delegate signed **Korean armistice.** Aug. 8 Mutual Defense Pact bet. U. S. and Korea signed. The Jap. Crown Prince Akihito arrived in Washn. for U. S. tour Sept. 28. On Sept. 26 Spain and U. S. signed 10-yr. defense agreement. Also in Sept. U. S. offered peace solution for Korea but the Reds still opposed a parley. On Oct. 5 former Gov. **Earl Warren of Calif. became 14th. Chief Justice** of U. S. On Nov. 20 a speed record of 1327 mph (2.1 times speed of sound) was set at Edwards AF Base, Calif. This month saw the accusation of ex-Pres. Truman by Atty. Gen. Herbert Brownell, Jr., of promoting **Harry Dexter White** (deceased) to post of U. S. Exec. Dir. of the Intl Monetary Fund in 1946, 'knowing' White to be a Russian spy. Governor of S. C. James F. Byrnes supported this statement. This led to serving of subpoenas on ex-Pres. Truman (unprecedented in U. S. history) and Gov. Byrnes. The subpoenas were rejected on Constitutional grounds, Truman defending action on White

as protecting FBI investigations. Secy. of State Dulles in Dec. warned our Eur. Allies of U. S. policy change on defense if EDC was not ratified soon. March 1 four fanatic Puerto Ricans **shot and injured five Congressmen** on the floor of House of Representatives. On Apr. 15 U. S. Far East Air Forces sent 25 planes from Japan to Philippines to help 'airlift' supplies to Fr. forces in Indo-China. May 13-15 Congress passed St. Lawrence Seaway Bill. Racial segregation in schools was ruled against by Supreme Court May 17, and June saw extension of Social Security coverage. The Com. Party in U. S. was outlawed in Aug. On Sept. 8 the U. S.-sponsored **South Asian collective defense** treaty (SATO) was signed in Manila by Australia, Brit., Fr., Netherlands, Pakistan, Philippines, Thailand, U. S. Construction of 1st comcl.-scale atomic power plant (after agreement with 5 Allied nations) was started (Labor Day) to launch limited version of world atomic energy pool plan. From Aug. 31-Sept. 15 the Atlantic Coast was ravaged by a series of hurricanes which caused over \$500 million damage. Death penalty for peacetime espionage and revocation of citizenship for conviction of advocating overthrow of govt. by violence was au. by Pres. Eisenhower on Sept. 3. Atom sub joined U. S. fleet in Sept. On Nov. 11, first Veterans' Day (WWI Armistice Day) 48,000 new citizens were naturalized. In December **Sen. Joseph R. McCarthy was 'condemned'** by the U. S. Senate (67-22) for contempt of a Senate Committee, for sneers, for bringing the Senate into dishonor and disrepute and obstructing its legislative processes. In December a **treaty** was signed by **U.S.A. and the Nationalist Chinese** government providing for the protection of **Formosa** and the **Pescadore islands.**

United States, Literature of. In the United States we have no such development of literature from popular origin as may be found in other countries. The earliest settlers came to America with a knowledge of the finest literature of the English tongue.

Colonial Period.—The first books that have America for their theme were written by explorers and discoverers. They are not, therefore, American literature in the strict sense of that term. The most important of these early accounts is that of the famous Captain John Smith (1580-1631), *True Relation of Such Occurrences and Accidents of Note as Hath Happened in Virginia*. This is an interesting and romantic work, but unfortunately not all early accounts of America are as worth reading. *The History of the Plymouth Plantation* by Gov. Bradford (1590-1657) and the *Journal* of himself and Edward Winslow (1595-1655), which give a contemporary history of the Plymouth Colony for its first thirty years, the *History of New England*, or journal of John Winthrop (1588-1649), governor of the Massachusetts Bay Colony, are productions of a colder clime than Virginia and of a less glowing imagination than Captain John Smith's. In New England, where most books were written, if not always there published, we find chiefly theological polemics, often presented with attractive titles but rarely with any other power to carry them to posterity. *The Tenth Muse* of Anne Bradstreet was a volume of poems, very highly praised in its day. *The Day of Doom*, a poem by Michael Wigglesworth (1631-1705), should be noted, but almost the only book of lasting value and interest written in the century was Cotton Mather's (1663-1728) *Magnalia Christi Americana* (1702). Another famous book was the *Bay Psalm Book* (1640) the work of John Eliot (1604-90), Richard Mather

(1596-1699), and Thomas Welde (1590-1662).

In later years the book most widely diffused beside the Bible was the almanac. Franklin's (1706-1790) *Poor Richard's Almanac*, begun in 1732 and carried on by him for twenty-five years, was a book of almost literary rank. 'Poor Richard' was a fictitious character in whose mouth Franklin put a simple philosophy which became as widely popular in its sphere as the most scholarly utterance of the Spectator. We may note, with the rest of this household literature, the *New England Primer* (begun 1691) which, like the *Bay Psalm Book*, is eminently characteristic, if not at all literary. A book of quite a different kind that gives us also an excellent idea of the time is the *Diary* of Judge Sewall of Boston, which runs from 1673 to 1729. Timothy Dwight (1752-1817), of Yale, produced the first 'American Epic,' his *Conquest of Canaan*. The two great literary figures of the eighteenth century may be properly grouped together; Jonathan Edwards (1703-58), representing the passing domination of theology; Benjamin Franklin, the domination just beginning of politics and secular common sense. Edwards' great works on the *Freedom of the Will* and other theological topics are probably now read by few, but Franklin's *Autobiography* is still one of the most interesting things of its kind. John Trumbull (1750-1831) produced a vigorous and realistic satire, *The Columbiad*. Joel Barlow (1754-1812) celebrated the possibilities of America in the rolling lines then fashionable, but is better remembered by a minor production, *Hasty Pudding*. In the years preceding the Revolution another real opportunity opened, and oratory became one of the genuine modes of national expression. Patrick Henry (1725-89), John Adams (1735-1826), James Otis (1725-83), Joseph Warren (1741-75), Richard Henry Lee (1732-94), and Samuel Adams (1722-1803) spoke under the best conditions for literature, because they had something that had to be said and Philip Freneau (1752-1832) published verses that were inspired by patriotic fire.

The literary center of America after the first quarter of the century shifted from New York to Boston, but there is one figure, Edgar Allan Poe (1809-49), who, although born in Boston, belongs to the South by early environment and education. To Poe we owe the development of the short story as a means of artistic presentation, a fact which

has been more highly appreciated in our day than it was in his own. In 1845 Poe published his poem *The Raven*, followed by *Annabel Lee* and *The Bells*. These poems, together with his *Tales* and other short stories, struck a new note in American literature. They seemed to belong to some 'outer world far from the practicality of every-day life.' After the passing of the Knickerbocker group, New England dominated the literature of the 19th century. In religion we find Unitarianism; in philosophy we have Transcendentalism; in politics the anti-slavery movement; in civic life philanthropy and reform. Emerson, Channing, Transcendentalism, Whittier, Brook Farm, Concord, Wendell Phillips, Thoreau, these names represent a good deal in American letters and all of it powerfully idealistic. In poetry, the New England school brought forth two great names, Henry Wadsworth Longfellow (1807-82) and John Greenleaf Whittier (1807-92). Longfellow presented the beauty and charm of American life and history in melodious and figured verse. Best known of his poems is *The Song of Hiawatha*, an agreeable reproduction of some of America's aboriginal legends. Whittier expressed the soul of American life and history in lyrics of sincere human quality.

Among novelists of the New England school the name of Nathaniel Hawthorne (1804-64) stands in the first rank. No better novels have been written in America than *The Scarlet Letter*, *The House of the Seven Gables*, and *The Blithedale Romance*. The Puritan traditions are strong in Hawthorne and for that very reason his novels are representative of his day and generation. Ralph Waldo Emerson (1803-82) was the most eminent figure among the transcendentalists. Transcendentalism was in essence an idealism that expressed a confidence in the excellence, and, therefore, the rights and privileges of human nature, as far as ideas are concerned, and in an elevation of the aims of life above those of letters in the matter of form. In his *Essays* Emerson set forth his philosophy, but tempered the extremely rarefied air of transcendentalism with Yankee common sense and a sense of humor that prevented him from overvaluing himself.

The two wits of the New England group were Oliver Wendell Holmes (1809-94) and James Russell Lowell (1819-91). Holmes' *Autocrat of the Breakfast Table* is a humorous classic; his novel *Elsie Venner* is vivid with New England life; and his verses still

live. But it is as a humorist that he is best known—a field of writing in which America holds a very special place. James Russell Lowell was noteworthy as a poet, a critic, a scholar, and an essayist. The first of *The Biglow Papers*, in dialect verse, was a political satire in Yankee dialect on the Mexican war. The slavery question was now coming to the fore in politics and Lowell took up the cudgels vigorously on the anti-slavery side, and another series of dialect poems gave great aid to the abolition movement. His prose essays covered an astonishingly wide range of subjects.

Henry David Thoreau (1817-62) was a literary artist of unusual merit. *Walden* remains a vital book for all who like to read about nature. It is filled with minute and accurate observation, the fruit of a two years' sojourn in a cabin in the woods near Concord.

Specifically American, though perhaps more temporary, is the oratory of the period in New England and elsewhere. Political conditions were still such as to encourage eloquence. Three names stand together as representative of American public life: Daniel Webster (1782-1852), Henry Clay (1777-1852), and John C. Calhoun (1782-1850); their oratory has dignity, representative character, and force. Three other orators should be mentioned: Edward Everett (1794-1865), Wendell Phillips (1811-84), and Henry Ward Beecher (1813-87), one eminent on great public occasions, one in public discussion and agitation, and the third in the pulpit. To these must be added the name of a speaker whose simple sincerity gave him at times a greater power of speech than that of any other man of his day, Abraham Lincoln (1809-65).

The short-story was carried on by an increasing number of writers, among whom the most noteworthy were Fitz James O'Brien (1828-62); Harriet Prescott (1835-1921) (afterward Mrs. Spofford), and Edward Everett Hale (1822-1909). *The Diamond Lens*, *The Amber Gods*, and *The Man Without a Country* are typical works.

In history, also, was there first-rate expression. George Bancroft (1800-91), William H. Prescott (1796-1859), John Lothrop Motley (1814-77), and Francis Parkman (1823-93), were all original workers and all men of literary power. The first two were rather too much influenced by the literary ideals of the past, but Motley and Parkman attain a perfection of literary history which

seems impossible in our day of development and division of labor. Parkman's *The Oregon Trail* and Motley's *Rise of the Dutch Republic* remain classics in their respective fields.

In this second period of our literature occurred the Civil War. Such an event could not have been without its effect upon men of letters both South and North. In the North especially do we perceive the strongest influence: the anti-slavery element cannot be dissociated from the work of Lowell or Whitier. Yet in literature the war produced little of permanence. It is the backbone of Mrs. Harriet Beecher Stowe's (1811-96) title to remembrance; but powerfully effective as was *Uncle Tom's Cabin*, it is probable that there was more real genius in her presentations of the old New England life of which she was herself a product.

Humor was represented by the writings of Charles Farrar Browne ('Artemus Ward') (1834-67), Frank R. Stockton (1834-1902), and something more than mere humor by the genius of Samuel Langhorne Clemens ('Mark Twain') (1835-1910). Both these writers came out of the West, thus bringing to bear upon our literature the influence of another locality. It is true that Mark Twain made his home in later years in Connecticut, but his two classics *Tom Sawyer* and *Huckleberry Finn* are stories of the Mississippi River.

In the early eighties a change in tone was temporarily fashionable. The first noteworthy American representative of romantic or idealistic fiction which then began to appear was Marion Crawford (1854-1909), who has retained power and popularity for twenty-five years. He and a few other innovators were followed by a number of writers who found and presented the romance of American history. But the realistic movement was not without its results, for it directed American novelists, and especially story writers, into an appreciation of the specific qualities of different parts of their country. The first writer to have this special flavor was, it is true, the romanticist Bret Harte (1839-1902). His followers were more realistic. George Washington Cable (1844-1925) gave a charming presentation of Creole life in New Orleans, and since *The Grandisimes* (1880) there have been a great number who have drawn pictures of the life of particular localities. Most noteworthy of these are Sarah Orne Jewett (1849-1909), Marv E. Wilkins Freeman (1862-1930),

James Lane Allen (1849-1925), Thomas Nelson Page (1853-1922), S. Weir Mitchell (1829-1914), and Hamlin Garland (1860-1940).

At the beginning of the 20th century flourished also—some of them to continue in the same field for many years—numerous romancers. Wide favor greeted Winston Churchill's *The Crisis* and *Richard Carvel*. Owen Wister's *The Virginian*, and G. B. McCutcheon's *Graustark* tales. In addition to these and other historical novels, adventure romances, notably by Jack London, J. O. Curwood, and Zane Grey, had vogue; so too, the sentimental productions of John Fox, Jr., Gene Stratton-Porter, and Harold Bell Wright.

At the same time, however, the cult of realism, which subsequently became probably the dominant note in the American novel, had three talented and somewhat precursory representatives in Frank Norris (1870-1902), Stephen Crane (1871-1900), and Jack London (1876-1916). The disposition to represent life without qualifications and reservations, in their day unfashionable, was particularly strong in Crane.

Shortly after, realistic writing took the form of the purpose or problem-novel. Upton Sinclair (1878-) came to fame with his 'muckraking' novel *The Jungle* (1906), an exposé of the Chicago meat-packing industry. A socialist, his later works were directed chiefly against the evils of capitalism. Other notable contemporary practitioners of the problem-novel have been Ernest Poole (1880-1950), Charles Norris (brother of Frank Norris; 1881-1945) and Dorothy Canfield Fisher (1879-).

The psychological realism of James was to be continued by his friend and disciple, Edith Wharton (1862-1937), distinguished as novelist and short-story writer. Her scenes are rural New England, as in *Ethan Frome* (1911) and fashionable New York, as in *The Age of Innocence* (1920). Her gifts are for irony, epigram, and pictorial description. Booth Tarkington (1869-1946), whose stories of adolescents are little more than farcical, has frequently turned from romance to realism with success.

The main course of contemporary realism was set early in the century, nevertheless, especially by Robert Herrick (1868-1938) and Theodore Dreiser (1871-1945). *Sister Carrie* appeared in 1900, and in spite of the subsequent publication of *Jennie Gerhardt*, *The Financier*, and *The Genius*. Dreiser did

not come into wide public recognition until 1925, with the highly successful *An American Tragedy*. A naturalist after the manner of Zola, his works are marked by great force, sincerity, and an abundance of detail. The world he portrays is grim and tawdry, his individuals the helpless victims of environment and their emotions. Although a talented pioneer in freeing the American scene for realism, Dreiser frequently descends, because of weak style and lack of selective power, into ponderous journalism.

A worker in the same territory, likewise preoccupied with sex, with the individual's attempt to adapt himself to the complexities of modern life, and likewise impregnated with a sense of frustration, is Sherwood Anderson (1876-1941). Whereas Anderson is a subjectivist—almost solely a fictional autobiographer—Sinclair Lewis (1885-) possesses the objectivity more characteristic of the naturalist. Lewis' *Main Street* (1920) depicts the drabness of life in an American small town, his *Babbitt* deflates the American business man, his *Elmer Gantry* exposes a hypocritical preacher. His powers largely mimetic, Lewis is gifted with a capacity for anger and a talent for social satire. His substantial merits were recognized by the award of the Nobel prize in 1930.

Opposed to these realists, his doctrine being that art should represent life as it should be, not as it is, James Branch Cabell (1879-) has created for himself an imaginary province which he calls Poictesme. His romance, however, is colored by satire. Love, morality, patriotism, religion, though necessary, are but illusion. Cabell came into wide notice with *The Cream of the Jest*, *Jurgen* (1919), and subsequent works. His style is sophisticated, erudite, rhythmical. Joseph Hergesheimer (1880-) is also a stylist, his tastes running to the rococo, the decorative, the sensuous. Usually engaged in the period novel, his *The Three Black Pennys*, *Java Head*, *Cytherea*, and others have been acclaimed.

Ellen Glasgow (1874-1945) turned from local color writing dealing with Virginia to the semi-historical novel. Among her best are *Barren Ground* and *The Romantic Comedians*. Zona Gale (1874-1938), of Wisconsin, likewise graduated into realism with *Miss Lulu Bett*. Younger writers who came into prominence in the late 1920's include Louis Bromfield (1898-), Glenway Wescott (1901-), Oliver La Farge (1901-), John Dos Passos (1896-), Julian Green

(1900-), Thomas Wolfe (1900-1938). Thornton Wilder (1897-), whose *The Bridge of San Luis Rey* (1927) enjoyed enormous sales, escapes from realism into stylistic preciousness and a somewhat dilute neo-classicism.

American post-war youth found a glittering exponent in F. Scott Fitzgerald (1896-1940); the Greenwich Village revolt found able expression in the works of Floyd Dell (1887-), and in Chicago, Ben Hecht (1893-) sought to reflect the accelerated tempo of modern life.

Realism reached the point of hardness in the work of Ernest Hemingway (1896-), his *A Farewell to Arms* (1929) being perhaps one of the best novels of the World War that had appeared. Hemingway has cultivated a style of peculiar economy; narrative and externalities are emphasized and emotions are revealed only by indirection, as though they were too harrowing to be admitted. While they are intentionally 'hard-boiled,' his characters hint of a vein of sentimentality beneath. Hardness gives way even to savagery in the work of William Faulkner (1897-), who, after half a dozen books that had attracted critical notice, leaped to overnight fame with *Sanctuary* (1931). Also concerned with the baser types of Southern whites is Erskine Caldwell (1901-) whose *Tobacco Road* (1932) was dramatized (1933) with extraordinary success.

Parallel with the novel has been the amazing growth of the short story. In the hands of O. Henry (Sydney Porter, 1862-1910) it reached enormous popularity. Gifted with a French neatness of structure and a vivid grasp of the American scene, O. Henry made use of the surprise ending, which was widely imitated. From the myriad short-story writers since the World War, it is perhaps arbitrary to single out names, but the novelists Edith Wharton and Willa Cather have done distinguished work; Sherwood Anderson, in *Winesburg, Ohio* (1919) and *The Triumph of the Egg* (1921) made notable experiments to free the story form, may, in fact, have added something permanent; Wilbur Daniel Steele (1886-), an indifferent novelist, has showed a thorough mastery of the short-story technique and created many excellent stories of New England life; Ernest Hemingway, in *Men Without Women*, added force and authentic dialogue to the expression of post-war disillusion and weariness.

Of the writers of short character sketches

of satirical purpose, should be mentioned George Ade (1866-1944), for his *Fables in Slang*, and Finley Peter Dunne (1867-1936) for his *Mr. Dooley*. Ring Lardner (1885-1933), whose stories have an air suggestive of the newspaper sporting sheet and comic section, has a keen ear for the American argot and a photographic eye for the American guiltless of culture. Some of his best satire is assembled in *Round Up* (1929).

Up until the day of Clyde Fitch (1865-1909) the American drama had largely been composed of plays of country or New England life. The plays dealing with more sophisticated phases of existence were usually adaptations from European dramatists or English importations. Fitch selected themes from the social comedy of New York life, revealing the possibilities of drama in large cities of the United States. Perhaps his only play to survive is *The Truth*. William Vaughan Moody (1869-1910) followed the cue to seek American material, and in his *The Great Divide* dramatized the conflict between the psychology of New England and that of the Far West. Augustus Thomas (1859-1934) wrote melodramas typical of the earlier days in the Western states; later, as in *The Witching Hour*, he turned to problems of modern life. Percy MacKaye (1875-) made use of American historical and contemporary material; *The Scarecrow* is perhaps his best. Louis K. Anspacher (1878-1947) is best represented by *The Unchastened Woman*, the prolific Owen Davis (1874-) by *Icebound*, Susan Glaspell (1882-1948) by one of her latest plays, *Alison's House*.

Without doubt the foremost American dramatist was Eugene O'Neill (1888-1953) and one of the few American literary men comparable with the best of Europe. He first attracted wide attention in 1920, with *Beyond the Horizon*, a play depicting the imaginative yearnings of a young man on a decaying New England farm; in *Anna Christie* romance emerges from a setting of sordid realism; *Desire Under the Elms* reaches the heights of great tragedy. O'Neill is more solely experimental in the monodramas *The Emperor Jones* and *The Hairy Ape*, and again in *The Great God Brown*. In *Strange Interlude*, which is written in nine acts and which revives the use of the aside, O'Neill's psychological insight finds ample scope; in *Mourning Becomes Elektra* (1931), a play—more properly a trilogy of plays—of equal

length, the somber qualities of Greek drama are revived in New England.

Sidney Howard (1891-1939) is skilled in technic, dialogue, and in portraying character; *They Knew What They Wanted* and *The Silver Cord* are among the best modern American plays. Elmer Rice (1892-), after the notable expressionistic *The Adding Machine*, turned with signal effect to naturalism with *Street Scene*, and later to satirical comedies. Philip Barry (1896-1949), has a flair for dialogue and somewhat superficial comedy. Paul Green came to the fore with *In Abraham's Bosom* and *The House of Connelly*; usually he portrays negroes or decadent Southern aristocracy. Also of distinction in folk-drama are *Hell-Bent for Heaven* by Hatcher Hughes and *Sun-Up* by Lulu Vollmer. *The Green Pastures*, which describes heaven as imagined by simple Southern negroes, was adapted from sketches of Roark Bradford by Marc Connelly (1890-), who, with the ubiquitous and adroit Broadway collaborator George S. Kaufman (1889-), had also written *Beggar on Horseback*. One of the strongest American plays on the World War was *What Price Glory?* by Lawrence Stallings (1894-) and Maxwell Anderson (1888-). *Front Page*, by Ben Hecht and Charles MacArthur had a strong effect in speeding up the tempo of the Broadway play. George Kelly (1887-) graduated from vaudeville comedy into realism, as in *Craig's Wife*. Comedy, tinged with satire, is represented by Rachel Crothers (1878-), Robert Sherwood (1896-1955), and S. N. Behrman (1893-). The full effect on the drama of the talking pictures is not yet manifest.

Poetry also enjoyed a renaissance in the early part of the 20th century. Shortly after 1910 a new and tremendous interest in poetry began to appear. Harriet Monroe (1860-1936) led the way in 1912 by founding the magazine *Poetry*; dozens of other publications sprang up and the newspapers and general magazines began to devote space not only to original efforts but to the critical controversies which began to herald the advent of the new poetry. Poets in general sought new forms, new interpretations of the past, and artistic expression of the new in modern American life. Edwin Arlington Robinson (1869-1935) is generally accounted the greatest poet of the period; his work is pervaded with a modern-Puritan sense of tragedy and is distinguished by

depth, seriousness, and formal compactness. Robert Frost (1875-) deals realistically with New England, employing language markedly akin to that of common speech. *Spoon River Anthology* (1915), by Edgar Lee Masters (1869-1950) revealed the sordid aspects of village life realistically, much as did Anderson's *Winesburg, Ohio* later in prose, and with analogous effect on subsequent poetry. Vachel Lindsay (1879-1931) is a modern troubadour of the Middle West, utilizing sound effects in poetry; Carl Sandburg (1878-) has experimented with slang as a medium, and in public recitals accompanies his readings with a guitar. Among the lyricists, Edna St. Vincent Millay (1892-1950) won fame by the sophistication of her spirit and the sensuous beauty of her verse; Sara Teasdale (1884-1933), by the sensitivity and frankness of her expression; and Elinor Wylie (d. 1928) by the hard brilliance of her mind and the exquisite finish of her verse. The promising careers of Joyce Kilmer (1886-1918) and Alan Seeger (1888-1916) were cut short by World War I.

Among the most doughty warriors of the new poetry were the imagists, who by polemic, manifesto, and example strove to liberate the form and subject matter of poetry, but at the same time to restrict it to the presentation of images—as opposed to vague generalities—in hard, clear, concentrated form. The launcher of the movement was the radical aesthete Ezra Pound (1885-), ably seconded by Amy Lowell (1874-1925), who was also the author of distinguished poetry in many forms and the introducer of 'polyphonic prose.' Except for H. D. (Hilda Doolittle Aldington, 1886-), who carried the tenets to fruition, most of the imagists turned to other methods, as John Gould Fletcher (1886-1950) and Conrad Aiken (1889-).

A number of radical and nihilist poets have received considerable startled attention, resulting diversely in fervent admiration or scarification. The most influential of them is T. S. Eliot (1888-), after 1927 a British subject, whose poetry is an attempt to reflect the disintegration of modern consciousness; his aesthetic criticism in prose is also of the first importance. E. E. Cummings (1894-), William Carlos Williams (1883-), Maxwell Bodenheim (1895-1954), and Alfred Kreyenborg (1883-) belong, in varying degrees, to the same class. To be mentioned too are the widely different William Ellery Leonard (1876-1944), Stephen

Vincent Benet (1898-1943), Ridgely Torrence (1875-), James Weldon Johnson (1871-1938), and Countée Cullen (1903-1946), and Mark Van Doren (1894-). Robinson Jeffers (1887-) has been acclaimed as the most powerful of the recent poets.

Much history has been written in recent years, and although there have probably been no historians of the caliber of Motley and Parkman, many have done distinguished work, usually in special fields. John Fiske (1842-1901) was a philosopher before he became a historian. Justin Winsor (1831-1897) edited a work characteristic of his times, the *Narrative and Critical History of America*. Capt. A. T. Mahan (1840-1914) showed the influence of sea power; Charles Francis Adams, Jr. (1835-1915) and Henry Adams (1838-1918) proved themselves able critics of conventional views of history; E. Channing (1856-1931) covered the entire field of American history; A. B. Hart (1854-1943) is eminent in the same field; J. H. Robinson (1863-1936) turned with distinction from European history to popular psychology; J. H. Breasted (1865-1935) was an outstanding Orientalist; C. A. Beard (1874-1948) views American history from an economic standpoint; F. A. Ogg (1878-) is an authority on political science; S. B. Fay (1876-), C. Seymour (1885-), and B. Schmitt (1886-) have made important studies in the origins of World War I; H. E. Barnes (1889-) has considered numerous social aspects of history; A. Nevins (1890-) is important as journalist, biographer, and editor in the field of American history. In 1928 was published the first volume (of twenty) of the authoritative *Dictionary of American Biography*, under the auspices of the Council of Learned Societies of America. In 1930 appeared the first volume of the fifteen-volume *Encyclopaedia of the Social Sciences*, a monumental attempt to synthesize all the social sciences, under the editorship of the economist E. R. A. Seligman (1861-1939) and with A. S. Johnson (1874-) as associate editor.

After World War I increased interest in the men who had made history was manifest. Professional historians, largely under the influence of German doctoral methods which had reached American universities as early as the 1870's, were demarking for themselves ever narrower provinces of scholarly research. The popular interest in the past, consequently, gave rise to a great vogue for readable biography, written by individ-

uals of varying historical knowledge and literary skill. Gamaliel Bradford (1863-1934), with numerous psychological portraits of eminent Americans, was the American pioneer in the field. In spirit with the times, the note of which was sounded most dominantly by the somewhat obstreperous H. L. Menck-en (1880-), it was demanded that celebrated names and traditions of the past be re-evaluated. After the publication of *Eminent Victorians* (1918) and *Queen Victoria* (1921) by the Englishman Lytton Strachey (1880-1932), a manner and a method for the new biography were apparent. American writers turned, not to Bradford but to Strachey for a model, finding in him a welcome distaste for the preceding century, an impersonality, a disillusion, brilliant style, and a capacity for structure more common to novelists than to the earlier type biographers—qualities which proved most acceptable to the reading public.

Lives of all manner of men and women have been pouring from the presses, their popularity rivalling that of novels. One group of biographers deliberately set about 'debunking' famous names, whether to fix them in their supposedly true status or to reveal them as human beings, instead of papier-mâché idols. Characteristic examples are found in W. E. Woodward's and Rupert Hughes' treatment of Washington, E. L. Masters' life of Lincoln, Paxton Hibben's *Henry Ward Beecher*. Legions of others have been devoting themselves to writing lives, authentic but interesting, of figures prominent and obscure in politics, industry, religion, the arts, past or contemporary—the main essential for a subject frequently resting on the fact that he had lived. Noteworthy products, to list only a few more, were A. J. Beveridge's and Carl Sandburg's treatments of Lincoln, Thomas Beers' *Stephen Crane*, J. W. Krutch's and H. Allen's lives of Poe, Allan Nevins' *Frémont*, Carl Van Doren's *Swift*, H. Van Loon's *R. V. R.* (Rembrandt), R. S. Baker's life of Wilson. The biographers who have been the most popular in America, however, are the French writer André Maurois, and the German, Emil Ludwig.

At the same time a remarkable interest has been manifested in outline books and popular treatments of the various sciences, religion, philosophy, and history. One of the first phenomenal successes of this kind was *The Story of Philosophy* (1926) by Will Durant. To guide the public taste in the

selection of the best current work published, several book clubs were founded (1925-28), the subscribers to which receive monthly a new volume selected by a board of experts.

To turn back the prevailing tide of materialism, disillusion, and fervid belief in science which characterize contemporary American life and its literary expression, or at least to establish these on a basis of reference to the past, an attempt to revive humanism flowered in 1930 under the leadership of Irving Babbitt (1865-1933) and Paul Elmer More (1864-1937). Unable to formulate coherent doctrines among themselves, however, and opposed or ignored by the more characteristic leaders of literature, the neo-humanists collapsed as a cult.

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Units are those quantities in terms of which measurements are expressed. Fundamental units are those of length, mass, and time, and from these all other units, as of surface, volume, velocity, etc., are derived.

Dynamical Units.—In the British absolute system the fundamental units are the foot (length), pound (mass), and second (time), the unit of force being the poundal or force which, acting on one pound for one second, generates a velocity of one foot per second. The unit of work is the foot-poundal. For scientific purposes the British system has been largely replaced by the c.g.s. (centimeter-gram-second) and metric systems.

From the c.g.s. system the two systems of

electrical units, electrostatic and electromagnetic, are derived. The former is based on the force exerted between two quantities of electricity, the latter on the force between two magnetic poles.

Electrostatic Units.—Unit quantity of electricity is chosen as that which repels a similar quantity of unit distance with unit force. Unit current conveys unit quantity in unit time, while unit E.M.F. exists between two points when unit current flowing between them does unit work. Hence the units of resistance and capacity are derived.

Magnetic Units.—Unit magnetic pole repels unit like pole in air with unit force. The strength of a magnetic field is measured by the force acting on unit magnetic pole at that point, unit field acting on unit pole with unit force. See MAGNETISM.

Electro-magnetic Units.—Unit current is that current which, in a circular arc of unit length and unit radius, acts on unit pole at the center with unit force. Unit quantity is conveyed by unit current in unit time. Unit E.M.F. is generated in a conductor of unit length moving with unit velocity in unit field. From these the units of resistance and capacity are derived.

Universalism in America begins with the arrival in Good Luck, N. J., in 1770, of the Rev. John Murray of London, regarded by Thomas Potter as the Lord's answer to his prayer for a preacher for the meeting-house he had built and opened to all denominations. In 1803, a convention of the order, at Winchester, N. H., adopted the Profession of Belief, more briefly restated in Boston in 1899 as: (1) The Universal Fatherhood of God; (2) the Spiritual authority and leadership of His Son, Jesus Christ; (3) the trustworthiness of the Bible as containing a revelation from God; (4) the certainty of just retribution for sin; (5) the final harmony of all souls with God. A significant liberty clause was added to the Winchester Profession.

While predicating that God purposes an ultimate moral harmony of all souls, Universalism discriminates between belief in a result and faith in the instrumental forces. It insists that effective faith in final universal salvation must rest on implicit belief in the value and potency of Truth, Righteousness, and Love, witnessed by the free and steadfast use of these great and only means to the desired end. The teaching of Jesus, with which his life and works accord, is inter-

preted as a distinct revelation of these facts and principles.

Universal Language, a language that should be capable of serving as an easy means of communication throughout the world. All through the Middle Ages and down to the Reformation Latin served this purpose. For many years French was the most widely spread language, as it still continues to be the speech of diplomacy; but in point of vogue English appears now to be gaining ground rapidly, especially in the commercial world. Ever since the time (1666) of Leibnitz, attempts have been made to devise an artificial language to serve this purpose—by Bishop Wilkins, Condorcet, and Steiner. Three of the latest, as also the most successful schemes, are Esperanto, Volapük, and 'Idiom neutral.'

University. The so-called ancient 'universities' of the Greek and Roman periods of history were cities or centers of learning and culture and not formally organized educational institutions as in mediæval and modern times. Antioch, Tarsus, Pergamum, Rhodes, Athens, and Alexandria are usually given as the leading cities of literary, scientific, and philosophical influence, and the meeting places of men of letters and science from many lands and cultures. During the early centuries of the mediæval period, two new forces sought to develop and extend their influence in Southern Europe, Eastern Asia and Northern Africa. The first of these was Christianity. The center which best represents a comprehensive attempt at an educational program under Christian direction was Constantinople. The second force was Mohammedanism, which began to develop schools and advance learning in the latter part of the eighth century. The eastern learning was gradually carried to Spain by travelling Mohammedan scholars, and there the 'universities' of Cordova, Granada, Toledo, and Seville were developed. The tendency of learned men to gather together for mutual help led to a process of segregation in suitable districts and around great teachers, often at certain schools connected with cathedrals or abbeys. The beginning of the university movement may be placed at about the close of the 12th century, at which time there were three preëminent universities in Europe, at Salerno, Bologna, and Paris, where Abélard developed the scholastic method of studying theology. Famous teachers would attract students, bodies of students

would attract other teachers, and thus a *studium* was created.

As used in the Middle Ages, the term university refers to any community of men recognized as an incorporated body. Thus in the earliest period when reference was made to an association of men for study, it was always 'university of scholars' or 'university of masters and scholars,' indicating that university alone might refer to any formally organized group, as a guild of carpenters, barbers. The 'nations' which played so large a part in the mediæval universities resulted from the diverse origins of the students, who were attracted from the several provinces and from foreign lands.

The word 'faculty,' as used in connection with the mediæval universities, refers to those teaching and studying the same group of subjects. The four faculties found in the leading universities represented four fields of higher learning—arts, theology, medicine, and law. Frequently the only way to secure university action on an important matter was 'with the consent of the four faculties.' The college system, characteristic of the Oxford and Cambridge organizations, really originated in Paris. Pious founders established endowments for the maintenance of a certain number of poor scholars during their university course. In Paris and in Oxford, however, the system developed in opposite directions. In the French capital the university maintained its preëminence in all that concerned the teaching, while at Oxford and Cambridge the colleges gradually monopolized the actual teaching of the students, the university confining itself to general organization, and in particular to the regulation of graduation. There are two great types of mediæval universities—one represented by Bologna, the other by Paris. The Bologna type is known as the 'students' university'; the Paris type as the 'masters' university.'

The universities of Germany are of later origin than those of France, England, and Italy, and in their development followed the French rather than the English form. The extent of the university development before 1600 is indicated by the following totals for each century beginning with the 12th, and by their distribution by countries. Six were founded in the 12th century, 16 in the 13th, 22 in the 14th, 35 in the 15th, and 28 in the 16th, a total of 107.

American Universities.—The development of the American colleges and universities may

be divided into three fairly well-defined periods. The first includes the colonial period, with the following institutions: Harvard (1636), William and Mary (1693), Yale (1701), Princeton (1746), Pennsylvania (1751), Columbia (1754), Brown (1764), Rutgers (1766), and Dartmouth (1769). The second period extends from the Revolution to the Civil War. Futile attempts were made to bring the colonial institutions into closer harmony with the ideas and needs of the people and the governments of the States. During this period, however, there was a marked tendency to throw off ecclesiastical control. The third period in the history of higher education in America begins with the Civil War, and is characterized by the founding of technical schools and the development of university work of a post-graduate character in many of the older institutions and in connection with new foundations as well.

University Extension, the offering of a systematic scheme of instruction by an institution of higher learning through its faculty to audiences and classes beyond the bounds of the university. It is applied particularly to evening courses open to all on a small payment, a sufficient number of which when passed lead to a degree. It aims to bring as far as possible within the reach of every one the advantages which are otherwise accessible only to those who can attend the college and university. The extension department is also a kind of clearing house for the dissemination of all kinds of information. Extension courses are open to any one who is able to pursue them with profit. Entrance requirements do not apply to the non-resident students. In addition to these, are the correspondence courses. The work for them must be prepared and administered with an eye to the peculiar difficulties involved when a student cannot meet his teacher personally.

Unknown Soldier, an unidentified soldier of World War I whose dead body, hurt beyond recognition, is taken as a symbol for national glory and national mourning. The origination of the idea has been variously ascribed, but at any rate it was quickly adopted by both the Allied Nations and the Central Powers. England in November, 1920, buried her Unknown Soldier beneath the nave of Westminster Abbey, France buried hers under the Arc de Triomphe in Paris. The United States buried her Unknown Soldier in 1921 in Arlington Cemetery.

AMERICAN COLLEGES AND UNIVERSITIES (1946-1947)

The list is based on the U. S. Government *Educational Directory*. C is used for coeducational; S for summer school; W for women alone; E for extension courses.

Name	Location	Year Organ.	Governing Official	No. of Studts.
Abilene Christian (C., E., S.)	Abilene, Texas	1906	Don H. Morris	1,433
Adelphi (W., E., S.)	Garden City, N. Y.	1896	Paul D. Eddy	1,200
Adrian (C., E., S.)	Adrian, Mich.	1859	Samuel J. Harrison	188
Agnes Scott (W.)	Decatur, Ga.	1889	James Ross McCain	480
Akron, Univ. of (C., E., S.)	Akron, Ohio	1870	H. E. Simmons	4,800
Alabama (W., E., S.)	Montevallo, Ala.	1896	A. F. Harman	902
*Alabama Poly. Inst. (C., E., S.)	Auburn, Ala.	1872	Luther Noble Duncan	5,100
Alabama, Univ. of (C., E., S.)	University, Ala.	1831	Raymond R. Paty	5,800
*Alaska Univ. of (C., E.)	Fairbanks, Alaska	1917	Charles E. Bunnell	268
Albion (C.)	Albion, Mich.	1815	William W. Whitthouse	822
Albright (C., E., S.)	Reading, Pa.	1856	Harry V. Masters	380
Albertus Magnus (W., E., S.)	New Haven, Conn.	1925	Sister Mary Boyle	176
Alfred Univ. (C., S.)	Alfred, N. Y.	1836	J. Edward Walters	645
Allegheny (C., S.)	Meadville, Pa.	1815	J. Richie Schultz	735
Alma (C.)	Alma, Mich.	1886	Roy W. Hamilton	306
American International (C.)	Springfield, Mass.	1885	William Gellermann	600
American Univ. (C.)	Washington, D. C.	1861	Paul F. Douglass	1,141
Amherst	Amherst, Mass.	1821	Charles W. Cole	810
Antioch (C.)	Yellow Springs, Ohio	1853	Algo D. Henderson	680
*Arizona, Univ. of (C., E., S.)	Tucson, Ariz.	1885	James B. McCormick	4,100
Arkansas (C., S.)	Batesville, Ark.	1872	John D. Spragins, Jr.	220
Ark. Agric. and Mech. (C., S.)	Monticello, Ark.	1913	Marvin S. Bankston	512
Arkansas State (C., E., S.)	Jonesboro, Ark.	1910	William J. Edens	680
*Arkansas, Univ. of (C., E., S.)	Fayetteville, Ark.	1871	Lewis Webster Jones	1,275
Armour Inst. of Tech. (S.)	Chicago, Ill.	1892	Z. T. Johnson	1,321
Asbury (C., S.)	Wilmore, Ky.	1890	Raymond W. Bixler	514
Ashland (C., S.)	Ashland, Ohio	1878	E. R. Naylor	177
Athens (C., E., S.)	Athens, Ala.	1842	Rufus E. Clement	100
Atlanta Univ. (C., S., N.)	Atlanta, Ga.	1867	H. S. Hilley	112
Atlantic Christian (C., E., S.)	Wilson, N. Car.	1902	G. Eric Jones	367
Atlantic Union (C., S.)	S. Lancaster, Mass.	1882	B. M. Christensen	316
Augsburg Coll. & Theo. Sem. (C.)	Minneapolis, Minn.	1860	L. M. Stavig	1,200
Augustana (C., E., S.)	Sioux Falls, S. Dak.	1860	Conrad Bergendoff	450
Augustana Col.; The Sem. (C., S.)	Rock Island, Ill.	1860	Theodore P. Stephens	533
Aurora (C.)	Aurora, Ill.	1893	William B. Guerrant	210
Austin (C., E., S.)	Sherman, Texas	1849	Nelson P. Horn	783
Baker Univ. (C., S.)	Baldwin City, Kan.	1858	Louis C. Wright	438
Baldwin-Wallace (C., E., S.)	Berea, Ohio	1845	Edward C. Fuller	1,217
Bard (form. St. Stephen's)	Annandale-on-Hudson, N. Y.	1860	V. C. Gildersleeve (Dean)	120
Barnard (W.)	New York, N. Y.	1880	Charles F. Phillips	981
Bates (C., S.)	Lewiston, Me.	1864	Pat. M. Neff	705
Baylor Univ. (C., S.)	Waco, Texas	1845	Raymon M. Kistler	3,070
Beaver (W., S.)	Jenkintown, Pa.	1851	Bayard Dodge	625
Beirut, Amer. Univ. of (C., S.)	Beirut, Lebanon, Syria	1864	G. T. Gillespie	1,701
Belhaven (W., S.)	Jackson, Mich.	1893	Carey Cronce	272
Beloit (C.)	Beloit, Wisc.	1846	Frederick Burkhardt	598
Bennington (W.)	Bennington, Vt.	1912	Francis S. Hutchins	275
Berea (C., S.)	Berea, Ky.	1855	James A. Lindsay	846
Berry (C., S.)	Mt. Berry, Ga.	1902	C. L. McGinty	492
Bessie Tift (W.)	Forsyth, Ga.	1847	Emory Lindquist	242
Bethany (C., S.)	Lindsborg, Kan.	1881	Wilbur H. Gramblet	304
Bethany (C.)	Bethany, W. Va.	1840	Ed. G. Kaufman	365
Bethel (C., S.)	Newton, Kan.	1887	Roy N. Baker	248
Bethel (C., S.)	McKenzie, Tenn.	1847	Ernest T. Eaton	259
Billings Poly. Inst. (C., E., S.)	Polyshtech, Mont.	1908	George R. Stuart	682
Birmingham-Southern (C., E., S.)	Birmingham, Ala.	1856	Lawrence T. Lowrey	976
Blue Mountain (W., S.)	Blue Mountain, Miss.	1871	Arthur L. Hungerford	304
Blue Ridge (C.)	New Windsor, Md.	1810	Lloyd L. Ramseyer	215
Bluffton (C., S.)	Bluffton, Ohio	1900	Bob Jones, Jr. (Act.)	264
Bob Jones (C., S.)	Cleveland, Tenn.	1928	William L. Klecher	1,154
Boston (C., E., S.)	Newton, Mass.	1863	Daniel L. Marsh	2,462
Boston Univ. (C., E., S.)	Boston, Mass.	1869	Kenneth C. M. Sills	1,688
Bowdoin	Brunswick, Me.	1794	Frank J. Froat	628
Bowling Green State Univ. (C., E., S.)	Bowling Green, Ohio	1910	Frederic R. Hamilton	2,070
Bradley Poly. Inst. (C., E., S.)	Peoria, Ill.	1896	Josiah Crudup	990
Brenau (W., S.)	Gainesville, Ga.	1878	Sister Jean Marie	178
Brier Cliff (W.)	Sioux City, Iowa	1930	Paul H. Bowman	48
Bridgewater (C.)	Bridgewater, Va.	1880	Howard S. McDonald	300
Brigham Young Univ. (C., E., S.)	Provo, Utah	1876	Harry D. Gideonse	3,000
Brooklyn (C., E., S.)	Brooklyn, N. Y.	1930	Henry Merritt Wriston	3,101
Brown Univ. (C.)	Providence, R. I.	1764	Henry Merritt Wriston	1,661
Pembroke (W.) (Brown Univ.)	Providence, R. I.	1892	Katharine E. McBride	468
Bryn Mawr (W.)	Bryn Mawr, Pa.	1885	Herbert L. Spencer	635
Bucknell Univ. (C., E., S.)	Lewisburg, Pa.	1846	Henry Olson	1,218
Buena Vista (C., S.)	Storm Lake, Iowa	1884	Samuel P. Capen (Chan.)	325
Buffalo, Univ. of (C., E., S.)	Buffalo, N. Y.	1846	M. O. Ross	4,858
Butler Univ. (C., E., S.)	Indianapolis, Ind.	1855	Lee A. Du Bridge	1,985
California Inst. of Tech.	Pasadena, Calif.	1891		883

Name	Location	Year Organ.	Governing Official	No. of Stdts.
*California, Univ. of (C., E., S.)	Berkeley, Calif.	1868	Robert G. Sproul	11,000
Cal., U. of, at Los Angeles (C., S.)	Los Angeles, Calif.	1910	Robert G. Sproul	7,600
Calvin (C., S.)	Grand Rapids, Mich.	1866	Henry Schultze	475
Canisius (part C., E., S.)	Buffalo, N. Y.	1870	Timothy J. Coughlin	744
Capital Univ. (C., E., S.)	Columbus, Ohio	1850	Harold L. Yochum	721
Carleton (C.)	Northfield, Minn.	1866	Laurence Mc K. Gould	808
Carnegie Inst. of Tech. (C., S.)	Pittsburgh, Pa.	1900	Robert E. Doherty	3,000
Carroll	Helena, Mont.	1910	Emmet Riley	100
Carroll (C., S.)	Waukesha, Wisc.	1846	Gerrit T. Vander Lugt	618
Carson-Newman (C.)	Jefferson City, Tenn.	1851	James T. Warren	430
Carthage (C., S.)	Carthage, Ill.	1870	Erland Nelson	200
Case Sch. of Applied Science (E., S.)	Cleveland, Ohio	1880	William E. Wickenden	927
Catawba (C., E., S.)	Salisbury, No. Car.	1851	Alvin R. Keppel	520
Catholic Univ. (part C., S.)	Washington, D. C.	1887	Rt. Rev. P. McCormick	1,728
Cedar Crest (W.)	Allentown, Pa.	1868	Dale H. Moore	300
Cedarville (C., E., S.)	Cedarville, Ohio	1804	Ira D. Vayhinger	84
Centenary (C., S.)	Shreveport, La.	1825	Joe J. Mickle	1,470
Central (C., E.)	Fayette, Mo.	1854	Harry S. De Vore	724
Central Univ. (C., S.)	Pella, Iowa	1853	Irwin J. Lubbers	305
Centre (C., S.)	Danville, Ky.	1810	Walter A. Groves	374
Chapman (C., S.)	Los Angeles, Calif.	1920	George N. Reeves	288
Charleston, Coll. of (C., S.)	Charleston, So. Car.	1785	George D. Grice	391
Chattanooga, Univ. of (C., E., S.)	Chattanooga, Tenn.	1886	David A. Lockmiller	617
Chestnut Hill	Philadelphia, Pa.	1871	Sister M. Kosta (Dean)	134
Chicago, Univ. of (C., E., S.)	Chicago, Ill.	1802	Robert M. Hutchins	14,500
Chowan (C.)	Murfreesboro, N. Car.	1848	J. L. Carrick	75
Cincinnati, Univ. of (C., E., S.)	Cincinnati, Ohio	1870	Raymond Walters	4,200
Citadel, The	Charleston, So. Car.	1842	Gen. C. P. Summerrall	600
Claremont Colleges (C., S.) (see Pomona Coll. and Scripps Coll.)	Claremont, Calif.	1925	E. Wilson Lyon	77
Clark Univ. (part C., E., S.)	Worcester, Mass.	1887	Howard Jefferson	424
Clarke (W., E., S.)	Dubuque, Iowa	1843	Sister Mary Ambrose	341
Clarkson Coll. of Tech.	Potsdam, N. Y.	1866	J. A. Ross, Jr.	564
*Clemson Agricultural (S.)	Clemson, So. Car.	1893	R. F. Poole	1,800
Coe (C., S.)	Cedar Rapids, Iowa	1881	Byron S. Hollinshead	792
Coker (W.)	Hartsville, So. Car.	1908	Donald C. Agnew	236
Colby (C., E.)	Waterville, Me.	1820	Julius S. Bixler	635
Colgate Univ.	Hamilton, N. Y.	1819	Everett N. Case	750
Colorado (C., S.)	Colorado Sp'gs, Colo.	1874	Thurston J. Davis	807
Colorado Sch. of Mines (S.)	Golden, Colo.	1874	Ben H. Parker	771
*Colorado State Coll. (C., S.)	Fort Collins, Colo.	1879	Roy M. Green	2,048
Colorado, Univ. of (C., E., S.)	Boulder, Colo.	1876	Robert L. Stearns	8,400
Columbia Univ. (part C., E., S.)	New York, N. Y.	1754	Dwight Eisenhower	15,200
Concordia (C.)	Moorhead, Minn.	1891	J. N. Brown	515
Connecticut Coll. for Women (E.)	New London, Conn.	1911	Rosemary Park	718
*Connecticut University	Storrs, Conn.	1881	Albert N. Jorgensen	8,000
Converse (C.)	Spartanburg, So. Car.	1889	Edwin M. Gwathmey	347
Cooper Union (C.)	New York, N. Y.	1859	Gano Dunn	1,130
Cornell (C., S.)	Mt Vernon, Iowa	1853	Russell D. Cole	610
*Cornell Univ. (C., S.)	Ithaca, N. Y.	1865	Edmund E. Day	7,700
Creighton Univ. (part C., S.)	Omaha, Nebr.	1878	Rev. W. H. McCabe	1,345
Culver-Stockett (C., E., S.)	Canton, Mo.	1853	Walter H. McDonald	336
Cumberland Univ. (C., S.)	Lebanon, Tenn.	1842	Edwin S. Preston	422
Dakota Wesleyan Univ. (C., S.)	Mitchell, So. Dak.	1885	Joseph H. Edge	325
Dana (C., E., S.)	Blair, Nebr.	1884	R. E. Morton	140
Daniel Baker (C., E., S.)	Brownwood, Texas	1880	Mrs. J. W. Trapp	318
Dartmouth	Hanover, N. H.	1760	John S. Dickey	1,900
Davidson (S.)	Davidson, No. Car.	1836	John R. Cunningham	768
Davis and Elkins (C., S.)	Elkins, W. Va.	1904	E. B. Purdum	210
Dayton, Univ. of (C., S.)	Dayton, Ohio	1850	George J. Renneker	2,700
Defiance (C., S.)	Defiance, Ohio	1902	H. D. Hopkins	300
*Delaware, Univ. of (C., E., S.)	Newark, Del.	1833	William H. Carlson	951
Denison Univ. (C., E., S.)	Granville, Ohio	1851	Kenneth J. Brown	850
Denver, Univ. of (C., E., S.)	Denver, Colo.	1864	Caleb Gates	8,100
De Paul Univ. (C., E., S.)	Chicago, Ill.	1898	Conerford J. O'Malley	7,600
DePauw Univ. (C.)	Greencastle, Ind.	1837	Clyde E. Wildman	1,489
De Sales (C., S.) (closed)	Toledo, Ohio	1936		281
Detroit Inst. of Tech. (S.)	Detroit, Mich.	1891	L. M. McKnight (Acting)	950
Detroit, Univ. of (C., E., S.)	Detroit, Mich.	1877	L. M. McKnight (Act.)	4,300
Dickinson (C.)	Carlisle, Penn.	1781	William W. Edel	600
Doane (C.)	Crete, Nebr.	1872	Bryant Drake	305
Drake Univ. (C., S.)	Des Moines, Iowa	1881	Henry Gadd Harmon	2,100
Drew Univ. (C.)	Madison, N. J.	1867	Arlo Ayres Brown	548
Drexel Inst. of Tech. (C., S.)	Philadelphia, Penn.	1891	James Creese	2,300
Dropsie (C.)	Philadelphia, Pa.	1907	Abraham A. Neuman	42
Drury (C.)	Springfield, Mo.	1871	James F. Findlay	351
Dubuque, Univ. of (C., E., S.)	Dubuque, Iowa	1852	Dale D. Welch	409
Duke Univ. (C., S.)	Durham, No. Car.	1838	Robert Lee Flowers	4,100
Duquesne Univ. (C., S.)	Pittsburgh, Pa.	1878	Rev. Francis P. Smith	2,000
D'Youville (W.)	Buffalo, N. Y.	1908	Sister Grace	300
Earlham (C.)	Richmond, Ind.	1847	Thomas E. Jones	429
Eastern Nazarene (C.)	Quincy, Mass.	1918	Samuel Young	223
Elizabethtown (C., E., S.)	Elizabethtown, Pa.	1900	A. C. Baugher	170

Name	Location	Year Organ.	Governing Official	No. of Stds.
Elmhurst (C.)	Elmhurst, Ill.	1871	Timothy Lehmann	369
Elmira (W., E.)	Elmira, N. Y.	1855	William S. A. Pott	368
Elon (C., E., S.)	Elon College, N. C.	1889	Leon E. Smith	407
Emmanuel (W.)	Boston, Mass.	1919	Sister Teresa Patricia	514
Emmanuel Missionary (C., S.)	Berrien Springs, Mich.	1910	Alvin W. Johnson	341
Emory and Henry (C., S.)	Emory, Va.	1836	Foye G. Gibson	388
Emory Univ. (part C., S.)	Atlanta, Ga.	1915	Goodrich C. White	3,000
Emporia, Coll. of (C.)	Emporia, Kan.	1882	D. A. Hirschler	123
Erskine (C.)	Due West, So. Car.	1839	Robert C. Grier	350
Eureka (C.)	Eureka, Ill.	1855	Burrus Dickinson	232
Evansville (C., E., S.)	Evansville, Ind.	1854	Lincoln B. Hale	440
Ferris (C., S.)	Cleveland, Ohio	1881	Cecil V. Thomas	1,500
Findlay (C., S.)	Findlay, Ohio	1884	C. A. Morey (Act.)	212
Fisk Univ. (C., S., N.)	Nashville, Tenn.	1865	Charles S. Johnson	495
Flora MacDonald (W., S.)	Red Springs, N. Car.	1896	Henry G. Bedinger	245
Florida State (W., S.)	Tallahassee, Fla.	1905	Doak S. Campbell	2,048
*Florida, Un. of (E., S.)	Gainesville, Fla.	1853	John J. Tigert	1,278
Fordham Univ. (part C., E., S.)	New York, N. Y.	1841	Rev. Robert J. Cannon	4,200
Fort Hays Kansas State (C., E., S.)	Hays, Kan.	1903	Lyman Dwight Wooster	830
Franklin (C.)	Franklin, Ind.	1834	William Gear Spence	368
Franklin and Marshall	Lancaster, Pa.	1787	Theodore August Distler	966
Friends (C., S.)	White, Kan.	1898	Charles Reagan (Acting)	412
Furnam Univ. (C., S.)	Greenville, So. Car.	1836	John L. Plyler	1,200
Gallaudet (C.)	Washington, D. C.	1864	Leonard M. Elstad	140
Geneva (C., E., S.)	Beaver Falls, Pa.	1849	M. M. Pearce	590
George Washington Univ. (C., S.)	Washington, D. C.	1849	Cloyd H. Marvin	8,200
Georgetown Univ.	Washington, D. C.	1821	Rev. L. C. Gorman	2,700
Georgia Sch. of Tech. (S.)	Atlanta, Ga.	1888	Blake R. Van Leer	5,900
Georgia State Coll. for Women (E., S.)	Milledgeville, Ga.	1880	Guy H. Wells	1,200
Georgia State Woman's (E.)	Valdosta, Ga.	1906	Frank R. Reade	141
*Georgia, Univ. of (C., S.)	Athens, Ga.	1785	Harmon W. Caldwell	1,500
Georgian Court (W., S.)	Lakewood, N. J.	1908	Mother Mary John	175
Gettysburg (C., S.)	Gettysburg, Pa.	1832	H. W. A. Hanson	648
Conzaga Univ. (E., S.)	Spokane, Wash.	1887	Francis E. Corkery	718
Good Counsel (W.)	White Plains, N. Y.	1912	Mother M. Aloysia	200
Goshen (C., E., S.)	Goshen, Ind.	1844	Ernest E. Miller	326
Coucher (C., S.)	Baltimore, Md.	1887	David A. Robertson	673
Greensboro (W.)	Greensboro, N. Car.	1838	Luther L. Goppel	177
Greenville (C., S.)	Greenville, Ill.	1802	H. J. Long	216
Grinnell (C., S.)	Grinnell, Iowa	1846	S. N. Stevens	740
Grove City (C., S.)	Grove City, Pa.	1876	Weir C. Kettler	900
Guilford (C., S.)	Greensboro, N. C.	1817	Clyde A. Milner	407
Gustavus Adolphus (C.)	St. Peter, Minn.	1862	Edward Carlson	767
Hamilton	Clinton, N. Y.	1812	Dwight Worcester	450
Hamline Univ. (C.)	St. Paul, Minn.	1854	Charles Nelson Pace	619
Hampden-Sydney	Hampden-Sydney, Va.	1775	E. J. Gammon	391
Hampton Institute (C., E., S., N.)	Hampton, Va.	1868	Ralph P. Bridgman	1,000
Hanover (C.)	Hanover, Ind.	1827	Albert G. Parker, Jr.	365
Hardin-Simmons Univ. (C., E., S.)	Abilene, Texas	1891	Rupert N. Richardson	1,200
Harding (C., S.)	Searcy, Ark.	1924	George S. Benson	500
Hartwick (C., E., S.)	Oneonta, N. Y.	1928	H. J. Arnold	102
Harvard Univ. (part C., S.)	Cambridge, Mass.	1636	James Bryant Conant	4,000
Hastings (C., E., S.)	Hastings, Neb.	1882	William M. French	648
Haverford	Haverford, Pa.	1833	Gilbert F. White	316
*Hawaii, Univ. of (C., E., S.)	Honolulu, T. H.	1907	Gregg M. Sinclair	2,703
Heidelberg (C.)	Tiffin, Ohio	1850	Nevin C. Harner	409
Hendrix (C., S.)	Conway, Ark.	1884	Matt L. Ellis	438
High Point (C., E., S.)	High Point, N. Car.	1924	G. I. Humphreys	448
Hillsdale (C.)	Hillsdale, Mich.	1844	Harvey L. Turner	372
Hiram (C.)	Hiram, Ohio	1850	Paul H. Fall	340
Hobart (E.)	Geneva, N. Y.	1822		378
William Smith (W.)	Geneva, N. Y.	1908		146
Hollins (W.)	Hollins College, Va.	1842	Bessie Carter Randolph	308
Holy Cross, Coll. of the	Worcester, Mass.	1843	Rev. William J. Healy	1,250
Hood (W., E.)	Frederick, Md.	1893	Henry I. Stahr	454
Hope (C.)	Holland, Mich.	1866	Irwin J. Lubbers	473
Houghton (C., S.)	Houghton, N. Y.	1883	Stephen W. Paine	489
Houston Coll. for Negroes (C.)	Houston, Texas	1927	E. E. Oberholtzer	1,500
Houston, Univ. of (C., E., S.)	Houston, Texas	1912	E. E. Oberholtzer	6,500
Howard (C., E., S.)	Birmingham, Ala.	1844	Harwell G. Davis	1,000
Howard Payne (C., E., S.)	Brownwood, Texas	1889	Thomas H. Taylor	787
Howard Univ. (C., S., N.)	Washington, D. C.	1867	Mordecai W. Johnson	1,300
Hunter (W., E., S.)	New York, N. Y.	1870	George N. Shuster	13,000
Huntington (W., E., S.)	Montgomery, Ala.	1909	Hubert Searcy	414
Huntington (C., S.)	Huntington, Ind.	1897	Elmer Becker	177
Huron (C., E., S.)	Huron, So. Dak.	1883	George F. McDougall (D'n)	242
Idaho, Coll. of (C., S.)	Caldwell, Idaho	1891	William W. Hall, Jr.	444
*Idaho, Univ. of (C., E., S.)	Moscow, Idaho	1889		2,300
Illinois (C.)	Jacksonville, Ill.	1829	H. Gary Hudson	406
*Illinois, Univ. of (C., E., S.)	Urbana, Ill.	1867	George D. Stoddard	15,000
Illinois Wesleyan Univ. (C., S.)	Bloomington, Ill.	1859	William E. Shaw	764
Immaculate (W., S.)	Immaculata, Pa.	1921	Francis J. Furey	221
Immaculate Heart (W., S.)	Los Angeles, Calif.	1906	Sister M. Eucharis	518

Name	Location	Year Organ.	Governing Official	No. of Stdts.
Incarnate Word (W., S.)	San Antonio, Texas	1900	Sister M. Columkille	528
Indiana Central Univ. (C., S.)	Indianapolis, Ind.	1902	I. Lynd Esch	366
Indiana Univ. (C., E., S.)	Bloomington, Ind.	1820	Herman B. Wells	10,000
International Y. M. C. A. (S.)	Springfield, Mass.	1885	Ernest M. Best	521
*Iowa State Coll. (C., E., S.)	Ames, Iowa	1868	Charles E. Frilley	7,738
Iowa State, Univ. of (C., E., S.)	Iowa City, Iowa	1847	Virgil M. Hancher	7,000
Iowa Wesleyan (C., S.)	Mt. Pleasant, Iowa	1842	Stanley B. Niles	241
James Millikan Univ. (C.)	Decatur, Ill.	1901	J. Walter Malone	552
Jamestown (C., E., S.)	Jamestown, No. Dak.	1881	Howard J. Bell	412
John Carroll Univ. (C., S.)	Cleveland, Ohio	1886	Rev. T. J. Donnelly	663
John B. Stetson Univ. (C., S.)	Deland, Fla.	1883	William Sims Allen	811
John Brown Univ. (C., S.)	Siloam Springs, Ark.	1919	John E. Brown	500
John Fletcher (C., S.)	Univ. Park, Iowa	1906	Rev. C. W. Butler	174
Johns Hopkins Univ. (part C., E., S.)	Baltimore, Md.	1876	Isaiah Bowman	4,000
Joh'n C. Smith Univ. (C., E., S., N.)	Charlotte, N. Car.	1867	Henry L. McCrorey	605
Judson (W.)	Marion, Ala.	1818	J. I. Riddle	264
Juniata (C., E., S.)	Huntingdon, Pa.	1867	Charles C. Ellis	412
Kalamazoo (C.)	Kalamazoo, Mich.	1833	Paul L. Thompson	366
Kansas City	Kansas City, Mo.	1930	Clarence R. Decker	3,000
*Kansas State Coll. (C., E., S.)	Manhattan, Kan.	1863	Milton S. Eisenhower	4,122
Kansas, Univ. of (C., E., S.)	Lawrence, Kan.	1864	Deane W. Malott	4,827
Kansas Wesleyan Univ. (C., S.)	Salina, Kan.	1885	Herbert J. Root	300
Kent State Univ. (C., E., S.)	Kent, Ohio	1910	George A. Bowman	4,000
Kentucky State (C., E., S., N.)	Frankfort, Ky.	1886	R. B. Atwood	626
*Kentucky, Univ. of (C., E., S.)	Lexington, Ky.	1866	Herman Lee Donovan	5,936
Kenyon	Gambier, Ohio	1824	Gordon K. Chalmers	300
Keuka (W.)	Keuka Park, N. Y.	1888	Henry E. Allen	100
King (C., S.)	Bristol, Tenn.	1867	R. T. L. Liston	225
Knox (C., E.)	Galesburg, Ill.	1837	Lyndon O. Brown	651
Knoxville (C., E., S., N.)	Knoxville, Tenn.	1875	William L. Ives	294
Lafayette	Easton, Pa.	1820	Ralph C. Hutchison	912
LaGrange (W.)	LaGrange, Ga.	1831	H. T. Quillian	129
Lake Erie (W., E.)	Painesville, Ohio	1856	Helen D. Bragdon	180
Lake Forest Univ. (C.)	Lake Forest, Ill.	1857	E. A. Johnson (Act.)	370
Lambuth (C.)	Jackson, Tenn.	1924	Richard E. Womack	211
Lander (W.)	Greenwood, So. Car.	1872	John Marvin East	460
La Salle (E., S.)	Philadelphia, Pa.	1863	Brother Emilian	448
La Verne (C.)	La Verne, Calif.	1891	C. Ernest Davis	180
Lawrence (C.)	Appleton, Wisc.	1847	Nathan M. Fusey	1,000
Lebanon Valley (C., E., S.)	Annaville, Pa.	1866	Clyde A. Lynch	405
Lehigh Univ. (S.)	Bethlehem, Pa.	1866	Martin D. Whittaker	2,077
Leland (C., E., S., N.)	Baker, La.	1870	J. M. Frazier	200
Le Moyne (C., S., N.)	Memphis, Tenn.	1870	Hollis F. Price	419
Lenoir Rhyne (C., E., S.)	Hickory, No. Car.	1891	P. E. Monroe	392
Lewis Institute (C., S.)	Chicago, Ill.	1895	Henry T. Heald	1,000
Limestone (W., S.)	Gaffney, So. Car.	1845	R. C. Granberry	408
Lincoln Univ. (N.)	Lincoln, Pa.	1854	Horace M. Bond	389
Lincoln Memorial Univ. (C., S.)	Harrrogate, Tenn.	1897	S. W. McClelland	545
Linfield (C.)	McMinnville, Ore.	1857	Harry L. Dillin	457
Lindenwood Female College	St. Charles, Mo.	1827	Harry Morehouse Gage	403
Long Island Univ. (C., E., S.)	Brooklyn, N. Y.	1926	T. W. Metcalfe (Dean)	1,305
Loretto Heights (W., S.)	Loretto, Colo.	1918	Sister Francetta (Dean)	200
Louisiana (C., E., S.)	Pineville, La.	1906	Edgar Godbold	483
Louisiana Poly. Inst. (C., E., S.)	Ruston, La.	1894	Claybrook Cottingham	2,200
*Louisiana State Univ. (C., E., S.)	Baton Rouge, La.	1860	Harold W. Stoke	7,000
Louisville, Univ. of (C., S.)	Louisville, Ky.	1837	John W. Taylor	3,193
Lowell Textile Inst. (C., E.)	Lowell, Mass.	1895	Kenneth R. Fox	221
Loyola Univ. (part C., E., S.)	New Orleans, La.	1912	Rev. James Hussey	1,564
Loyola (E.)	Baltimore, Md.	1852	Rev. Edward B. Bunn	382
Loyola Univ. (E.)	Los Angeles, Calif.	1865	Rev. E. J. Whelan	407
Loyola Univ. (part C., E., S.)	Chicago, Ill.	1870	Rev. Joseph M. Egan	3,000
Luther (C.)	Decorah, Iowa	1861	O. J. H. Preus	443
Lynchburg (C., S.)	Lynchburg, Va.	1903	R. B. Montgomery	261
Macalester (C.)	St. Paul, Minn.	1885	Charles J. Turk	706
MacMurray Coll. for Women (S.)	Jacksonville, Ill.	1846	Clarence P. McClelland	618
*Maine, Univ. of (C., E., S.)	Orono, Me.	1865	Arthur Andrew Hauck	1,999
Manchester (C., S.)	N. Manchester, Ind.	1895	Vernon F. Schwalm	700
Manhattan (S.)	New York, N. Y.	1863	Brother B. Thomas	1,166
Manhattanville	New York, N. Y.	1841	Mother Eleanor	345
Marietta (C.)	Marietta, Ohio	1835	William A. Shimer	390
Marion (C., S.)	Marion, Ind.	1919	William F. McConn	198
Marquette Univ. (C., E., S.)	Milwaukee, Wisc.	1861	Rev. Peter A. Brooks	5,400
Marshall (C., E., S.)	Huntington, W. Va.	1837	John B. Williams	2,200
Mary Baldwin (W.)	Staunton, Va.	1842	Martha Grafton (Dean)	309
Mary Hardin-Baylor (W., E., S.)	Belton, Texas	1845	Gordon G. Singleton	494
Marygrove (W., S.)	Detroit, Mich.	1910	Sister M. Honora	502
*Maryland, Univ. of (C., E., S.)	Baltimore, Md.	1807	H. C. Byrd	6,000
Marylhurst (W., E., S.)	Marylhurst, Ore.	1930	Sister M. Augusta	187
Mary Manse	Toledo, Ohio	1922	Sister M. C. Raynor	177
Marymount (W.)	Tarrytown, N. Y.	1907	M. Therese Dalton	250
Maryville (C.)	Maryville, Tenn.	1819	Ralph Waldo Linyd	818

Name	Location	Year Organ.	Governing Official	No. of Stds.
Marywood (W. E. S.)	Scranton, Pa.	1915	Mother M. Sylvia	467
*Mass. Inst. of Tech. (C. S.)	Cambridge, Mass.	1865	Karl Taylor Compton	4,400
*Massachusetts State (C. E. S.)	Amherst, Mass.	1863	Hugh Potter Baker	1,700
McKendree (C. E. S.)	Lebanon, Ill.	1828	Carl C. Bracy	168
McMurry (C. E. S.)	Abilene, Texas	1921	Harold G. Cooke	450
McPherson (C. E. S.)	McPherson, Kan.	1887	W. W. Peters	1,000
Mercer Univ. (C. S.)	Macon, Ga.	1833	Spring Dowell	419
Mercyhurst (W. S.)	Erie, Pa.	1926	Mother M. Borgia	310
Meredith (W.)	Raleigh, No. Car.	1891	Carlyle Campbell	520
Miami Univ. of (C. S.)	Coral Gables, Fla.	1925	Bowman Foster Ashe	2,400
Miami Univ. (C. E. S.)	Oxford, Ohio	1899	Ernest H. Hahne	3,356
Mich. Col. of M'ng & Tech. (C. S.)	Houghton, Mich.	1885	Grover C. Dillman	900
*Michigan State Coll. (C. E. S.)	East Lansing, Mich.	1855	John A. Hannah	9,000
Michigan Univ. of (C. E. S.)	Ann Arbor, Mich.	1817	Alexander G. Ruthven	17,000
Middlebury (C. E.)	Middlebury, Vt.	1800	Samuel S. Stratton	1,400
Middlesex Univ.	Waltham, Mass.	1849		475
Midland (C. E. S.)	Freemont, Nebr.	1887	W. P. Hieronymus	600
Miles Memorial (C. E. S., N.)	Birmingham, Ala.	1908	William A. Bell	386
Milligan (C.)	Milligan Coll., Tenn.	1882	Virgil L. Elliott	331
Mills (C. E. S.)	Oakland, Calif.	1852	Lynn T. White, Jr.	570
Millsaps (C. S.)	Jackson, Miss.	1891	M. L. Smith	624
Milton (C. E. S.)	Milton, Wisc.	1867	C. L. Hill	200
Milwaukee-Downer	Milwaukee, Wisc.	1851	Lucia R. Briggs	314
*Minnesota Univ. of (C. E. S.)	Minneapolis, Minn.	1868	James L. Morrill	18,500
Misericordia, College (W. E. S.)	Dallas, Pa.	1923	Sister Mary Gonzaga	266
Mis'n House Acad., Col. & Sem. (C.)	Plymouth, Wisc.	1862	Paul Grosshuesch	168
Mississippi (S.)	Clinton, Miss.	1826	D. M. Nelson	400
*Mississippi State (C. S.)	Starkville, Miss.	1878	Fred T. Mitchell	3,000
Miss. State Coll. for Women	Columbus, Miss.	1884	B. L. Parkinson	1,008
Mississippi Univ. of (C. E. S.)	Oxford, Miss.	1848	Alfred B. Butts (Chan.)	1,482
Mississippi Woman's (S.)	Hattiesburg, Miss.	1912	W. E. Holcomb	142
*Missouri Univ. of (C. E. S.)	Columbia, Mo.	1839	Frederick A. Middlebush	5,086
Mines & Metallurgy, Sch. of (C.)	Rolla, Mo.	1871	Curtis L. Wilson (Dean)	894
Missouri Valley (C. S.)	Marshall, Mo.	1888	J. Ray Cable	279
Monmouth (C. S.)	Monmouth, Ill.	1856	J. H. Grier	506
*Montana State Coll. (C.)	Bozeman, Mont.	1893	R. R. Renne	2,000
Montana State Univ. (C. E. S.)	Missoula, Mont.	1893	James A. McCain	2,116
Moravian Coll. & Theo. Sem. (S.)	Bethlehem, Pa.	1807	Raymond S. Hauptert	179
Moravian Sem. & Coll. for Women	Bethlehem, Pa.	1742	Edwin J. Heath	200
Morgan (C. S., N.)	Baltimore, Md.	1867	Dwight O. W. Holmes	1,100
Morningside (C. S.)	Sioux City, Iowa	1894	Earl A. Roudman	540
Morris Harvey (C. E. S.)	Charleston, W. Va.	1888	Leonard Riggelman	511
Mount Holyoke (W.)	South Hadley, Mass.	1837	Roswell Gray Ham	1,100
Mt. Mary (W. E. S.)	Milwaukee, Wisc.	1915	Edward A. Fitzpatrick	385
Mt. Mercy (W. E. S.)	Pittsburgh, Pa.	1929	Mother M. Irenaeus	249
Mt. St. Joseph Coll. of (W. S.)	Cincinnati, Ohio	1920	Mother Mary Zoe	253
Mt. St. Mary's (W. E. S.)	Los Angeles, Calif.	1925	Sister Mary de Lourdes	310
Mt. St. Mary's (E. S.)	Emmitsburg, Md.	1830	Msgr. J. L. Sheridan	300
Mt. St. Scholastica (W. S.)	Atchison, Kan.	1863	Mother Lucy Dooley	251
Mt. St. Vincent Coll. of (W. E. S.)	New York, N. Y.	1910	Sister Catherine	487
Mt. Union (C. S.)	Alliance, Ohio	1846	Charles B. Ketcham	622
Muhlenberg (part E. S.)	Allentown, Pa.	1867	Levering Tysen	511
Muskigum (C. E. S.)	New Concord, Ohio	1837	Robert N. Montgomery	698
National Univ. (C. S.)	Washington, D. C.	1869	L. C. Garnett	1,180
Nazareth (W. S.)	Nazareth, Mich.	1912	Sister M. Kevin	112
Nazareth (W. E. S.)	Rochester, N. Y.	1924	Sister Teresa Marie	240
*Nebraska Univ. of (C. E. S.)	Lincoln, Nebr.	1869	R. Gustavson	7,101
Neb. Wesleyan Univ. (C. E. S.)	Lincoln, Nebr.	1888	Benjamin F. Schwartz	451
Negro Agric. and Tech. (C. E. S.)	Greensboro, No. Car.	1891	F. D. Bluford	854
*Nevada Univ. of (C.)	Reno, Nev.	1874	John O. Moseley	1,129
Newark Coll. of Engineer. (C. E. S.)	Newark, N. J.	1881	Allan R. Cullimore	942
Newark Univ. of (C. S.)	Newark, N. J.	1935	George H. Black	1,191
Newberry (C. S.)	Newberry, So. Car.	1856	James C. Kinard	420
*New Hampshire Univ. of (C. E. S.)	Durham, New Hamp.	1866		3,200
*New Mexico Coll. (C. E. S.)	State Coll., N. Mex.	1889	Hugh Milton	1,139
New Mexico Sch. of Mines (C.)	Socorro, New Mex.	1889	E. J. Workman	149
New Mexico Univ. of (C. E. S.)	Albuquerque, N. M.	1892	John P. Wernette	3,100
New Rochelle Coll. of (W.)	New Rochelle, N. Y.	1904	Mother Thomas Aquinas	745
New York Coll. of the City of (part C. E. S.)	New York, N. Y.	1847	Harry N. Wright	10,641
New York Univ. (C. E. S.)	New York, N. Y.	1831	Harry W. Chase (Chan.)	35,700
Niagara Univ. (C. E. S.)	Niagara Falls, N. Y.	1856	Joseph M. Noonan	1,021
North Carolina (C. E. S., N.)	Durham, No. Car.	1925	James E. Shepard	591
N. Car. Univ. of (part C. E. S.)	Chapel Hill, N. Car.	1789	F. P. Graham	3,842
*N. Carolina State (C. E. S.)	Raleigh, N. Car.	1889	J. W. Harrelson (Dean)	2,215
*North Dakota Agric. (C. E.)	Fargo, N. Dak.	1890	C. A. Severson (Acting)	1,901
North Dakota Univ. of (C. E. S.)	Grand Forks, No. D.	1883	John C. West	1,967
Northeastern Univ. (part C. S.)	Boston, Mass.	1898	Carl S. Eli	4,816
Northwestern Nazarene (C.)	Nampa, Idaho	1913	L. T. Corlett	370
Northwestern (C.)	Watertown, Wisc.	1865	E. E. Kowalko	129
Northwestern Univ. (C. E. S.)	Evanston, Ill.	1851	Franklin B. Snyder	8,900
Norwich Univ. (S.)	Northfield, Vt.	1819	Homer L. Dodge	450
Notre Dame (W. S.)	South Euclid, Ohio	1927	Mother M. Vera	183

Name	Location	Year Organ.	Governing Official	No. of Sdts.
Notre Dame, Coll. of (W., E., S.)	Baltimore, Md.	1895	Sister Mary Frances	216
Notre Dame, Univ. of (S.)	Notre Dame, Ind.	1842	John J. Cavanagh	3,300
Oakland City (C., S.)	Oakland City, Ind.	1886	James E. Cox	90
Oberlin (C., S.)	Oberlin, Ohio	1833	William Stevenson	1,838
Occidental (C.)	Los Angeles, Calif.	1887	Arthur G. Coons	752
Oglethorpe Univ. (C., E., S.)	Atlanta, Ga.	1913	Philip Weitner	200
Ohio Northern Univ. (C., E., S.)	Ada, Ohio	1871	Robert O. McClure	736
*Ohio State Univ. (C., S.)	Columbus, Ohio	1870	Howard L. Bevis	16,000
Ohio Univ. (C., E., S.)	Athens, Ohio	1804	John C. Baker	3,385
Ohio Wesleyan Univ. (C.)	Delaware, Ohio	1842	Herbert J. Burgstahler	1,418
*Okla. Agric. & Mech. (C., E., S.)	Stillwater, Okla.	1891	Henry C. Bennett	10,000
Oklahoma Baptist Univ. (C., S.)	Shawnee, Okla.	1910	John W. Raley	758
Oklahoma City Univ. (C., E., S.)	Okla. City, Okla.	1910	Cluster O. Smith	944
Oklahoma Coll. for Women	Chickasha, Okla.	1908	C. Dan Procter	1,048
Oklahoma, Univ. of (C., E., S.)	Norman, Okla.	1890	George L. Gross (Act.)	6,700
Olivet (C.)	Kankakee, Ill.	1912	Grover Van Duyn	225
Olivet (C., S.)	Olivet, Mich.	1844	Malcolm B. Dana	294
*Oregon State (C., E., S.)	Corvallis, Ore.	1868	A. L. Strand	5,081
Oregon, Univ. of (C., S.)	Eugene, Ore.	1872	Harry K. Newburn	5,700
Ottawa Univ. (C., S.)	Ottawa, Kan.	1865	Andrew B. Martin	321
Otterbein (C.)	Westerville, Ohio	1847	J. Gordon Howard	431
Quachita Baptist (C., S.)	Arkadelphia, Ark.	1886	J. R. Grant	510
Our Lady of the Lake (W., S.)	San Antonio, Texas	1896	John L. McMahon	186
Ozarks, Coll. of the (C., S.)	Clarksville, Ark.	1891	Wiley L. Hurie	291
Pacific (C.)	Newberg, Ore.	1891	Emmet W. Guiley	96
Pacific, Coll. of the (C., S.)	Stockton, Calif.	1851	Tully C. Knoles	640
Pacific Union (C., S.)	Angwin, Calif.	1913	H. J. Klooster	517
Pacific Univ. (C.)	Forest Grove, Ore.	1849	Walter C. Giersbach	350
Panhandle Agric. & Mech. (C., S.)	Goodwell, Okla.	1909	Marvin McKee (Dean)	510
Park (C.)	Parkville, Mo.	1875	George I. Rohrbough	490
Parsons (C., E., S.)	Fairfield, Iowa	1875	Herbert C. Mayer	330
Pasadena (C., E., S.)	Pasadena, Calif.	1902	H. Orton Wiley	377
Pennsylvania Coll. for Women	Pittsburgh, Pa.	1866	Paul R. Anderson	321
Pennsylvania Military	Chester, Pa.	1821	Col. Frank K. Hyatt	110
*Pennsylvania State (C., E., S.)	State College, Pa.	1855	Ralph D. Hetzel	6,641
Penn., Univ. of (part C., E., S.)	Philadelphia, Pa.	1740	Thomas S. Gates	2,800
Pharmacy, College of (C., E.)	New York, N. Y.	1829	C. W. Ballard (Dean)	172
Philippines, Univ. of the (C., E., S.)	Manila, Philippine Isl.	1907	B. M. Gongalez	7,971
Phillips Univ. (C., S.)	Enid, Okla.	1907	Eugene S. Briggs	776
Piedmont (C., S.)	Demorest, Ga.	1897	A. R. Van Cleave	210
Pittsburgh, Univ. of (C., E., S.)	Pittsburgh, Pa.	1787	R. H. Fitzgerald	14,500
Polytechnic Inst. of Brooklyn (E., S.)	Brooklyn, N. Y.	1854	H. S. Rogers	4,500
Pomona (C., S.)	Claremont, Calif.	1887	E. Wilson Lyon	797
Portia (C.) (now Calvin Coolidge)	Boston, Mass.	1936	A. Chesley York (Dean)	161
Portland, Univ. of	Portland, Ore.	1901	Rev. Charles C. Miltner	700
Pratt Institute (C.)	Brooklyn, N. Y.	1887	Charles Pratt	5,258
Presbyterian (C., S.)	Clinton, So. Car.	1880	Marshall W. Brown	351
Princeton Univ.	Princeton, N. J.	1746	Harold W. Dods	3,900
Providence (C., E., S.)	Providence, R. I.	1917	V. Rev. F. C. Foley	1,100
*Puerto Rico, Univ. of (C., E., S.)	Rio Piedras, P. R.	1903	Jaime Benitez (Chan.)	4,115
Puget Sound, Coll. of (C., S.)	Tacoma, Wash.	1888	Robert F. Thompson	744
*Purdue Univ. (C., E., S.)	Lafayette, Ind.	1869	Frederick L. Hoyde	8,000
Queens	Flushing, N. Y.	1937	Paul Klapper	2,400
Queens (W.)	Charlotte, No. Car.	1857	Hunter B. Blakely	356
Radcliffe (W.)	Cambridge, Mass.	1879	Wilbur Jordan	1,200
Randolph-Macon	Ashland, Va.	1830	J. Earl Moreland	313
Randolph-Macon Woman's	Lynchburg, Va.	1893	Theodore H. Jack	673
Redlands, Univ. of (C., E., S.)	Redlands, Calif.	1907	George H. Armacost	750
Reed (C.)	Portland, Ore.	1904	Peter H. Odegard	696
Regis	Denver, Colo.	1888	John J. Flanagan	240
Regis (W., E., S.)	Weston, Mass.	1927	Sister Honora	473
Rensselaer Poly. Inst.	Troy, N. Y.	1824	L. W. Houston (V. Pres.)	1,192
*Rhode Island State (E.)	Kingston, R. I.	1892	Karl R. Woodward	886
Rice Institute, Wm. M. (C.)	Houston, Texas	1912	William V. Houston	1,435
Richmond, Univ. of (C., S.)	Richmond, Va.	1832	George M. Modlin	1,175
Rider (C., S.)	Trenton, N. J.	1865	F. F. Moore	1,200
Ripon (C.)	Ripon, Wisc.	1851	Clark G. Kuebler	423
Roanoke (C., S.)	Salem, Va.	1853	Chas. J. Smith	396
Robert	Istanbul, Turkey	1864	Floyd H. Black	663
Rochester, Univ. of (C., E., S.)	Rochester, N. Y.	1850	Alan Valentine	4,500
Rockford (W., E.)	Rockford, Ill.	1847	Mary A. Cheek	302
Rockhurst	Kansas City, Mo.	1914	Rev. T. M. Knapp	215
Rollins (C.)	Winter Park, Fla.	1885	Hamilton Holt	419
Rosary (W., E., S.)	River Forest, Ill.	1901	Sister M. Peter	559
Rose Polytechnic Inst.	Terre Haute, Ind.	1874	Donald B. Prentice	265
Rosemont (W., S.)	Rosemont, Pa.	1922		370
Russell Sage (W.)	Troy, N. Y.	1916	Helen M. McKinstry (Act.)	180
Rust (C., S., N.)	Holly Springs, Miss.	1866	L. M. McCoy	148
*Rutgers Univ. (E., S.)	New Brunswick, N. J.	1766	Robert C. Clothier	3,177
New Jersey Coll. for Women	New Brunswick, N. J.	1918	Margaret T. Corwin (D.)	1,033
St. Ambrose (C., E., S.)	Davenport, Iowa	1885	Amrose J. Burke	595
St. Anselm (S.)	Manchester, N. H.	1880	Bertrand C. Dolan	301
St. Benedict, Coll. of (W., S.)	St. Joseph, Minn.	1913	Mother Rosamond	239

Name	Location	Year Organ.	Governing Official	No. of Studts.
St. Benedict's.....	Atchison, Kan.	1858	R. Rev. C. McDonald.....	330
Bonaventure (part C, E, S.)	Albany, N. Y.	1859	Thomas Plassmann.....	423
Catherine, Coll. of (W., S.)	St. Paul, Minn.	1913	Sister Antonius.....	278
Edward's Univ.	Austin, Texas	1885	Rev. William Robinson.....	225
Elizabeth, Coll. of (W., E., S.)	Convent Sta., N. J.	1800	Sister Marie Jose.....	421
Francis.....	Brooklyn, N. Y.	1858	Rev. Brother Columbia.....	256
Francis.....	Loretto, Pa.	1845	V. Rev. J. H. Bocella.....	214
Francis, Coll. of (W., S.)	Joliet, Ill.	1915	Sister M. Aniceta.....	293
Francis Xavier (W., E., S.)	Chicago, Ill.	1912	Sister M. Huberta.....	191
John's Univ.	Collegeville, Minn.	1857	Alcuin Deutsch.....	451
John's.....	Annapolis, Md.	1784	John S. Kieffer.....	120
John's Univ. (part C, S.)	Brooklyn, N. Y.	1870	V. Rev. Wm. J. Mahoney.....	4,700
Joseph's Coll. for Women	Brooklyn, N. Y.	1916	Wm. T. Dillon (Dean).....	416
Joseph's (W.)	Emmitsburg, Md.	1800	Francis J. Dodd.....	179
Joseph's (S.)	Rensselaer, Ind.	1891	Very Rev. A. H. Dirksen.....	441
Joseph's.....	Philadelphia, Pa.	1851	John J. Long.....	525
Lawrence Univ. (C, E., S.)	Canton, N. Y.	1856	Eugene G. Bewkes.....	756
St. Louis Univ. (C, S.)	St. Louis, Mo.	1818	Patrick J. Hollaria.....	7,100
Fontbonne (W., E., S.) (St. Louis U.)	St. Louis, Mo.	1923	Mother M. O'Neill.....	450
Maryville (C, E, S.)	St. Louis, Mo.	1872	Rev. Mother Marie.....	145
St. Mary-of-the-Woods (W.)	St. M.-of-the-Woods, Indiana	1841	Mother Mary Bernard.....	290
St. Mary's.....	St. Mary's, Calif.	1863	Brother Austin.....	494
St. Mary's (W., S.)	Notre Dame, Ind.	1853	Sister M. Maddeleva.....	171
St. Mary's of the Springs (W., S.)	E. Columbus, Ohio	1924	Sister Anacletus.....	167
St. Mary's Seminary & Univ.	Baltimore, Md.	1791	V. Rev. J. J. Lardner.....	416
St. Mary's Univ. (part C, S.)	San Antonio, Tex.	1852	Walter F. Colatka.....	890
St. Michael's.....	Winoski Park, Vt.	1904	Rev. J. H. Petty.....	208
St. Olaf (C, S.)	Northfield, Minn.	1874	C. M. Gransku.....	1,147
St. Peter's.....	Jersey City, N. J.	1910	Rev. Vincens J. Hart.....	460
St. Rose, Coll. of (W., E., S.)	Albany, N. Y.	1920	M. Rev. E. F. Gibbons.....	164
St. Thomas, Coll. of	St. Paul, Minn.	1885	V. Rev. V. J. Flynn.....	866
St. Vincent (C, E, S.)	Latrobe, Pa.	1870	Alfred Koch.....	380
Salem (C, E, S.)	Salem, W. Va.	1888	S. Orestes Bond.....	181
Salem (W., E, S.)	Winston-Salem, N. C.	1772	Howard E. Rondthaler.....	247
San Antonio, Univ. of	San Antonio, Tex.	1844	Rev. W. J. Dunne.....	473
San Francisco, Univ. of (part C, E., S.)	San Francisco, Calif.	1855	Mother Leonor Mejia.....	262
San Francisco Coll. for Women	San Francisco, Calif.	1930	W. C. Gianera.....	516
Santa Clara, Univ. of	Santa Clara, Calif.	1851	Fr. Silvestre Sancho.....	4,480
Santo Thomas, Univ. of (C, S.)	Manila, P. I.	1926	Harold Taylor.....	275
Sarah Lawrence (W.)	Bronxville, N. Y.	1888	Rev. W. Coleman Nevins.....	920
Scranton, Univ. of (part C, S.)	Scranton, Pa.	1926	Frederick Hard.....	217
Scripps (W.)	Claremont, Calif.	1916	Harold O. Hand.....	755
Seattle (C, E., S.)	Seattle, Wash.	1891	C. Hoyt Watson.....	1,600
Seattle Pacific (C, E., S.)	Seattle, Wash.	1891	V. Rev. Wm. F. Kelley.....	455
Seton Hall	South Orange, N. J.	1856	James A. Reeves.....	459
Seton Hill (W, S.)	Greensburg, Pa.	1881	Robert P. Daniel.....	212
Shaw Univ. (C, E., S., N.)	Raleigh, No. Car.	1865	Paul M. Cousins.....	246
Shorter (W.)	Rome, Ga.	1873	Daniel A. Weaver.....	1,305
Shurtleff (C, E, S.)	Alton, Ill.	1817	Bancroft Beatley.....	518
Simmons (W, S.)	Boston, Mass.	1869	Edwin E. Voigt.....	329
Simpson (C, S.)	Indianola, Iowa	1860	Henry T. Moore.....	789
Sioux Falls (C, E., S.)	Sioux Falls, So. Dak.	1912	Herbert Davis.....	1,000
Skidmore (W.)	Sa'a'o'a Springs, N. Y.	1911	Norman M. Smith.....	2,051
Smith (W., S.)	Northampton, Mass.	1871	Joseph C. Connolly.....	384
South Carolina, Univ. of (C, S.)	Columbia, So. Car.	1801	I. D. Grothers.....	1,376
South Dakota Sch. of Mines (C.)	Rapid City, So. Dak.	1885	J. D. Weeks.....	800
So. Dakota State Coll. (C, S.)	Brookings, So. Dak.	1881	Alex. Guerry (C-Chan.).....	316
South Dakota, Univ. of (C, E., S.)	Vermillion, So. Dak.	1882	James A. Bell.....	1,432
South, Univ. of the	Sewanee, Tenn.	1857	Rufus B. von KleinSmid.....	12,000
Southeastern Univ. (C, S.)	Washington, D. C.	1917	Humphrey Lee.....	5,800
So. California, Univ. of (C, E., S.)	Los Angeles, Calif.	1880	Felton G. Clark.....	775
Southern Methodist Univ. (C, E., S.)	Dallas, Texas	1910	McFarl P. Culver.....	578
Southern Univ. (C, E., S., N.)	Scotlandville, La.	1914	Charles E. Diehl.....	532
Southwestern (C, S.)	Winfield, Kan.	1885	Joel L. Fletcher.....	2,550
Southwestern (C, E, S.)	Memphis, Tenn.	1875	J. N. R. Score.....	448
Southwestern La. (C, E, S.)	Lafayette, La.	1901	V. Rev. W. D. O'Leary.....	333
Southwestern Univ. (C, E, S.)	Georgetown, Tex.	1840	Donald B. Tresidder.....	5,600
Spring Hill (part C, E., S.)	Spring Hill, Ala.	1830	Hugh A. Kelsey.....	700
Stanford Univ. (C, S.)	Stanford Univ., Calif.	1885	Harvey N. Davis.....	605
Sterling (C, E, S.)	Sterling, Kan.	1887	G. Morris Smith.....	330
Stevens Inst. of Tech. (S.)	Hoboken, N. J.	1870	John Nason.....	695
Susquehanna Univ. (C, S.)	Selinsgrove, Pa.	1868	Martha B. Lucas.....	451
Swarthmore (C.)	Swarthmore, Pa.	1864	W. P. Tolley (Chan.).....	4,500
Sweet Briar (W.)	Sweet Briar, Va.	1901	A. D. Beittel.....	293
Syracuse Univ. (C, E., S.)	Syracuse, N. Y.	1870	E. C. Nance.....	588
Talladega (C, N.)	Talladega, Ala.	1867	M. E. Collins.....	220
Tampa, Univ. of (C, S.)	Tampa, Fla.	1931	Clyde W. Meredith.....	310
Tarkio (C, E., S.)	Tarkio, Mo.	1883	Wm. F. Russell (Dean).....	8,180
Taylor Univ. (C.)	Upland, Ind.	1846	Robert L. Johnson.....	7,700
Teachers (C, E, S.)	New York, N. Y.	1888	John B. Clark.....	176
Temple Univ. (C, E., S.)	Philadelphia, Pa.	1884		
Tennessee (W.)	Murfreesboro, Tenn.	1909		

Name	Location	Year Organ.	Governing Official	No. of Stdts.
Tennessee Poly. Inst. (C. S.)	Cookeville, Tenn.	1916	Everett Derryberry	968
*Tennessee, Univ. of (C. E., S.)	Knoxville, Tenn.	1794	James D. Hoskins	5,200
*Tex. Agr. & Mech. Coll. of (E., S.)	College Station, Tex.	1876	Thomas O. Walton	6,395
Texas Christian Univ. (C. S.)	Fort Worth, Tex.	1873	M. E. Sadler	3,700
Texas Coll. (C. E., S.)	Kingsville, Texas.	1925	E. N. Jones	1,272
Texas State Coll. for Women (S.)	Denton, Texas.	1903	Louis H. Hubbard	2,855
Texas Technological (C. E., S.)	Lubbock, Texas	1925	W. M. Whyburn	4,246
Texas, Univ. of (C. E., S.)	Austin, Texas.	1883	T. S. Painter	15,000
Texas Wesleyan (C. S.)	Fort Worth, Texas.	1891	Law Sone	619
Toledo, Univ. of (C. S.)	Toledo, Ohio.	1884	Philip C. Nash	4,400
Transylvania (C. S.)	Lexington, Ky.	1780	Raymond F. McLain	534
Trinity (E., S.)	Hartford, Conn.	1823	George K. Funston	502
Trinity (W.)	Washington, D. C.	1897	Sister C. Dorothea	372
Trinity Univ. (C. E., S.)	Waxahatchie, Texas.	1899	Monroe G. Everett	310
Tufts (C. E.)	Medford, Mass.	1852	Leonard Carmichael	2,400
Tulane Univ. (part C. S.)	New Orleans, La.	1814	Rufus C. Harris	6,900
Tulsa, Univ. of (C. S.)	Tulsa, Okla.	1894	C. I. Pontius	2,900
Tuskegee Normal & Indust. Inst. (C. S., N.)	Tuskegee Inst., Ala.	1881	Frederick D. Patterson	999
Union	Schenectady, N. Y.	1795	Conway Boatman	800
Union Univ. (C. S.)	Jackson, Tenn.	1814	John Jeter Hurt	350
U. S. Military Academy	West Point, N. Y.	1802	Maj. Gen. Maxwell D. Taylor	1,843
U. S. Naval Academy	Annapolis, Md.	1845	R. Adm. A. W. Fitch	2,400
Upsala (C. S.)	East Orange, N. J.	1893	Evald B. Lawson	530
Ursinus (C.)	Collegeville, Pa.	1860	Norman E. McClure	424
*Utah State Agric. (C. E., S.)	Logan, Utah.	1888	Franklin S. Harris	3,101
Utah, Univ. of (C. E., S.)	Salt Lake City, Utah.	1850	Albert R. Olpin	7,000
Valparaiso Univ. (C. E., S.)	Valparaiso, Ind.	1859	Rev. O. P. Kretzmann	441
Vanderbilt Univ. (C.)	Nashville, Tenn.	1873	C. M. Starratt	2,500
Vassar (W.)	Poughkeepsie, N. Y.	1861	Sarah G. Blanding	1,222
*Vermont, Univ. of, & State Agric. Coll. (C. S.)	Burlington, Vt.	1791	John S. Millis	1,485
Villanova (part C., E., S.)	Villanova, Pa.	1842	Rev. Francis McGuire	904
Virginia Military Inst.	Lexington, Va.	1819	Richard J. Marshall	709
*Virginia Poly. Inst. (C. S.)	Blacksburg, Va.	1872	John R. Hutcheson	2,700
Virginia State Coll. for Negroes (C. E., S.)	Petersburg, Va.	1882	Luther H. Foster	1,142
Virginia, Univ. of (part C., E., S.)	Charlottesville, Va.	1819	Colgate W. Darden, Jr.	2,697
Wabash	Crawfordsville, Ind.	1812	Frank Hugh Sparks	448
Wagner Mem'l Lutheran (C., E., S.)	Grymes Hill, S. I., N. Y.	1883	Walter C. Langsam	287
Wake Forest (S.)	Wake Forest, N. Car.	1814	Thurman D. Kitchin	1,080
Washburn (C., E., S.)	Topeka, Kan.	1895	Byron S. Stoffer	819
Washington (C.)	Chestertown, Md.	1782	Gilbert W. Mead	305
Washington and Jefferson (S.)	Washington, Pa.	1780	James H. Case, Jr.	500
Washington and Lee Univ.	Lexington, Va.	1749	Francis P. Gaines	994
*Wash. State, Coll. of (C., E., S.)	Pullman, Wash.	1890	Wilson B. Compton	3,000
Washington, Univ. of (C., E., S.)	Seattle, Wash.	1861	Raymond Allen	14,100
Washington Univ. (C., E., S.)	St. Louis, Mo.	1853	A. H. Compton	3,123
Wayne Univ. (C. S.)	Detroit, Mich.	1914	David D. Henry	20,300
Waynesburg (C. S.)	Waynesburg, Pa.	1860	Paul R. Stewart	400
Wellesley (W.)	Wellesley, Mass.	1870	Mildred McAfee Horton	1,508
Wells			Richard L. Green	323
Wesleyan Univ.	Middletown, Conn.	1831	Victor L. Butterfield	704
*West Virginia State (C., E., S., N.)	Institute, W. Va.	1891	John Warren Davis	1,005
*West Virginia Univ. (C., E., S.)	Morgantown, W. Va.	1897	Irvin Stewart	3,393
West Virginia Wesleyan (C., E., S.)	Buckhannon, W. Va.	1890	A. A. Schoolcraft (Acting)	493
Western Maryland (C., E., S.)	Westminster, Md.	1868	Fred G. Holloway	570
Western Reserve Univ. (part C., E., S.)	Cleveland, Ohio.	1826	W. G. Leutner	12,900
Westminster (C., E.)	New Wilmington, Pa.	1852	R. F. Galbraeth	712
Wheaton (C. S.)	Wheaton, Ill.	1860	V. R. Edman	1,400
Wheaton (W.)	Norton, Mass.	1814	A. Howard Menely	474
Whitman (C.)	Walla Walla, Wash.	1859	Winslow S. Anderson	571
Whittier (C., E., S.)	Whittier, Calif.	1901	William C. Jones	727
Wilberforce Univ. (C., E., N.)	Wilberforce, Ohio.	1896	Charles H. Wesley	766
Wiley (C., E., S., N.)	Marshall, Texas.	1873	E. C. McLeod	395
Williamette Univ. (C.)	Salem, Oreg.	1842	G. Herbert Smith	800
William and Mary, Coll. of (C., E., S.)	Williamsburg, Va.	1693	John E. Pomfret	1,299
William Jewell (C. S.)	Liberty, Mo.	1849	Walter P. Binns	463
Williams	Williamstown, Mass.	1793	James P. Baxter, 3rd	827
Wilson (W.)	Chambersburg, Pa.	1890	Paul Swain Havens	394
Winthrop (W., S.)	Rock Hill, So. Car.	1886	Henry R. Sims	1,741
*Wisconsin, Univ. of (C., E., S.)	Madison, Wisc.	1848	Edwin B. Fred	13,000
Wittenberg C., E., S.)	Springfield, Ohio.	1845	Rees Edgar Tulloss	967
Wofford (S.)	Spartanburg, S. Car.	1854	Walter K. Greene	500
Wooster, Coll. of (C., S.)	Wooster, Ohio	1866	Howard F. Lowry	1,013
Worcester Poly. Inst. (S.)	Worcester, Mass.	1895	Wat Tyler Cluervius	661
*Wyoming, Univ. of (C., E., S.)	Laramie, Wyo.	1887	George D. Humphrey	2,264
Xavier Univ. (part C. S.)	Cincinnati, Ohio	1831	Celestin J. Steiner	1,238
Yale Univ. (part C., E.)	New Haven, Conn.	1701	Charles Seymour	5,500
Yankton (C., E., S.)	Yankton, So. Dak.	1881	I. Clark Graham	319
Yeshiva (E., S.)	New York, N. Y.	1928	Samuel Berkin	213

(a) Includes Barnard College, Teachers College, College of Pharmacy, Bard College, and N. Y. Post-Graduate Medical School. (*) Are land grant Colleges.

Unleavened Bread, bread made without leaven. It is used in the Roman Catholic Church for the celebration of mass and the administration of the eucharist. The Feast of Unleavened Bread is a Jewish festival. It celebrates the exodus from Egypt of the Children of Israel.

Untermeyer, Louis (1885-), American poet and anthologist, and authority on contemporary poetry. His works include *Modern American Poetry* and *Modern British Poetry*; *Poetry—Its Appreciation and Enjoyment* (1934); *A Treasury of the World's Great Poems* (1942).

Untermeyer, Samuel (1858-1940), American lawyer, educated at the Columbia law school. He advised the government on the interpretation and enforcement of the income tax law; was an advocate of government ownership, as in rapid transit cases in New York City; and a leader of American Jews. President of the World Non-sectarian Anti-Nazi Council to Champion Human Rights.

Upjohn, Richard (1802-78), Anglo-American architect, born in England, removing to the U. S. in 1829. His most important commission was the design for the new edifice of Trinity church in New York City.

Upsala, tn., cap. of co. of same name, Sweden; has a castle and cathedral (built 1260-1435), with monuments of many kings and famous men. The university, founded in 1477, has the largest library in Sweden; Upsala has chemical factories, breweries, and brick works; p. 30,198.

Upton, George Putnam (1834-1919), American music critic and author. His books include: *Standard Operas* (1890); *Standard Light Operas* (1902).



*Earth and Uranus (U)
compared.*

Uremia, a morbid condition which occurs in association with deficiency of urea excretion. Uremia is characterized chiefly by cerebral disturbances, by dyspnoea, and by gastro-intestinal symptoms. Headache, convulsions, and coma are frequent. These symp-

toms are likely to follow if the total daily excretion of urea falls below 300 grains.

Ural, or **Yaik**, riv., Soviet Russia, tributary of the Caspian, and in part of its course forming the frontier between Europe and Asia.

Uralite. 1. A mineral, a variety of amphibole derived from pyroxene. It has the crystalline form of augite and the physical properties of hornblende. 2. A fireproof building material, composed of asbestos fibre with a proportion of sodium silicate and bicarbonate and some chalk.

Ural Mountains, a range on the n.e. of Soviet Russia, stretching nearly n. and s. from the Kara Sea (Arctic Ocean) toward the Caspian, with extreme elevations (Tölpos-Is, Sablyn) of from 5,000 ft. to 5,400 ft.

Uralsk, a town of Siberia, on the Ural River. It is a center for grain and cattle, and has a caviar industry; p. 35,994.

Uralsk Area, an administrative division of the Soviet Union, partly in Europe, partly in Asia. Great forests and, on the n., the vast tundra make much of the area unsuited for agriculture. The principal crops are wheat, oats, and rye. The area is 653,594 sq. m.; p. 6,791,875; p. 223,300.

Urania, in Greek mythology, the muse of astronomy; also a surname of Aphrodite (Venus), as personifying the passion of love in its nobler aspect.

Uranium, U, 238.5, a metallic element occurring principally in pitchblende which consists chiefly of uranous uranate, U(UO₄)₂. Uranium and its compounds emit rays, but it is likely that this is not due to the uranium itself, but to some other element, such as radium. See ATOMIC BOMB.

Uranometria, a catalogue of stars visible to the naked eye, generally accompanied by a set of maps.

Uranus, the seventh planet in order of distance from the sun, discovered by Herschel on March 13, 1781.

Uranus, in Greek mythology, the most ancient of the gods and their first ruler.

Urban. Eight popes adopted this name. **URBAN II.** (1088-99), successfully prosecuted the struggle of the papacy against Henry IV. of Germany and in 1094 excommunicated Philip I. of France. He presided over the Council of Clermont in 1095 which gave the impulse to the crusades. **URBAN VIII.** elected 1623, had a formidable antagonist in Richelieu, with whom he finally entered into an alliance against Austria and Spain.

Urbana, city, Ill., seat of the University

of Illinois, and of the Illinois State Laboratory of Natural History. The city is in a rich agricultural region; p. 22,835.

Urey, Harold Clayton (1893-), American chemist, born at Walkerton, Ind., studied at University of California and abroad. He taught at Johns Hopkins; at Columbia (1942-45); at Un. of Chicago (1945-). He won the Nobel Prize, 1934, for discovery of 'heavy hydrogen.'

Urethra, the membranous tube through which the urine is expelled from the bladder.

Urga, town, cap. of Mongolia. Here are many Buddhist temples, especially a famous Maidari shrine, to which over 100,000 pilgrims come yearly; p. 60,000.

Uri, Swiss canton, running s. from Lake of Lucerne; its people are German-speaking and Roman Catholics. It was one of the three original cantons, and is the legendary cradle of Swiss liberty (William Tell).

Uric Acid, $C_5H_4N_4O_6$, is a complex compound produced in the metabolism of nitrogenous bodies, and excreted by the kidneys.

Urim and Thummim, two objects, supposed to be stones of different colors, used in the older Hebrew worship, and connected with the ephod.

Urine, or the kidney excretion, contains the chief nitrogenous waste products resulting from the body metabolism. Healthy urine is a pale, clear, amber-colored fluid of peculiar odor, acid reaction, and a specific gravity of about 1.020.

Urmia (Rezaieh), town, Iran, in the province of Azerbaijan. In 1915 there was a massacre of Armenians by invading Turks, and in 1918 a tremendous exodus of Christians and a Turkish massacre of nearly two-thirds of those who remained; p. 49,800.

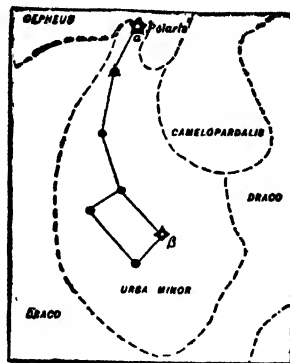
Urmia, Lake of (alt. 4,100 ft.), the largest lake in Iran, has a length of 80 m. and a breadth of from 12 to 25 m. It has no visible outlet.

Ursa Major, an ancient constellation in the Northern Hemisphere. Although including originally only the seven stars of the Plough, or the 'Dipper,' its designation as a Bear is primitive, and was familiar to the ancient Greeks, Phoenicians, Arabs, and American Indians. The same seven stars also figure in the East as a bier with three mourners.

Ursa Minor (Little Bear), an ancient constellation, said to have been introduced to the knowledge of Greek sailors by Thales from Phoenicia, about 600 B.C. Early recognized as the twin of the greater Bear, it was also

called the Twister, from its circling in the sky, and the Dog's Tail, or Cynosure, a name appropriated later to Polaris.

Ursula, Saint, a reputed British martyr of Cologne, the date of whose death is vari-



Ursa Minor.

ously given 237, 283, and 451. With 11,000 attendant virgins, she was massacred by the Huns at Cologne. Ursula is regarded as the patron saint of maidens. Her day is Oct. 21.

Ursulines, a teaching order, founded by St. Angela Merici of Brescia in 1537. She was canonized in 1807. She founded an association of young women for the tending of the sick and poor, and the instruction of children, and papal confirmation was obtained from Paul III. in 1544. In France Madeleine de Ste. Beuve endowed an Ursuline house at Paris in 1610. They were introduced into Savoy by St. Francis de Sales in 1635, and they have spread over Germany, Austria, and also Canada and the U. S.

Uruguay, smallest republic of South America. Stock raising is the chief occupation. Dr. Gabriel Terra, elected president in 1931, assumed dictatorial powers, overthrowing the constitution in 1933. A new constitution was approved in 1934 and Dr. Terra elected for another four-year term. Gen. Alfredo Baldomir was elected president in 1938.

The country is not mountainous, but several ranges of hills cross the plateau of the interior, and the rest is an undulating tableland. The climate is mild and healthful. The annual mean temperature is 61° F., the extremes being 97° and 5°. The vegetation is varied, there being over 400 species of medicinal plants alone. There are many wild animals, such as the tapir, deer, fox, ounce, puma, armadillo, wildcat, and monkey.

Uruguay was originally occupied by Span-

iards, who in 1624 founded a permanent colony on the banks of the Rio Negro, at Santo Domingo de Soriano. Portuguese colonists from Brazil gradually established trading posts which brought them into close contact with the Spaniards, until about 1723, a contest for supremacy ended in favor of the Spaniards. In 1810 the people revolted against Spain, and in 1814 the Spanish forces were compelled to evacuate Montevideo.

The coast of Uruguay and the harbor of Montevideo was the scene of the first major naval engagement of the World War II, 1939. In December three British cruisers came up with the German pocket battleship *Graf Spee*, which had been raiding British commerce in the South Atlantic. In a 14-hour running fight the *Graf Spee* and H.M.S. *Exeter* were badly damaged. The German ship ran into Montevideo harbor. The Uruguayan government permitted her to remain four days for temporary repairs. In the meantime the Allies brought up more ships and kept them outside the three-mile limit ready to again take up the fight. On Dec. 18 the *Graf Spee* raised anchor, steamed outside the harbor, and was scuttled by her crew.

The population is about 2,100,000. The capital and chief city is Montevideo; p. 2,525,000.

UNRRA. United Nations Relief and Rehabilitation Administration, was organized in 1943 to provide relief and rehabilitation for war victims in countries freed from war.

Uruguay River, a South American river rising in Southern Brazil, and later forming



Urus.

the boundary between Uruguay and Argentina.

Urus (*Bos primigenius*), the ancient long-horned wild ox of Europe, the principal ancestor of the existing domesticated forms.

USO. United Service Organizations, Inc., was formed Feb. 1941 to provide recreational, spiritual and welfare services to men not at the front.

Utah (named for the Ute Indians), one

of the Western States of the United States. The central topographical feature of Utah is formed by the Wasatch Mountains, which enter the State near the middle of the northern boundary, and trend southward almost across it, with a slight bow toward the e. The region e. of the Wasatch range is a lofty barren plateau. In the south central part of this eastern plateau are several ranges, among which are the Henry, Abajo, and La Sal Mountains and Orange Cliffs.

West of the Wasatch are found two considerable deserts—the Great American in the northern half, and the Escalante toward the s.w. Lying between the Wasatch Mountains and the Great American Desert is Great Salt Lake, the largest salt lake in America, about 75 m. long, and from 20 to 50 m. wide, and having an area of about 2,000 sq. m. There are nine islands in the lake, the largest of which are Antelope and Stansbury. The climate is distinctly continental. The mean temperature at Salt Lake City is 31° in January and 73° in July, with extremes of —20° and 102°. The extremes are less in the valleys than upon the plateau or the mountain ranges. There are extensive areas of sandy loam in the river valleys. The remainder of the soil is sometimes alkaline or too gravely to respond readily to cultivation, but usually becomes quite fertile under irrigation. Utah abounds in wonders of nature. Zion National Park, in southwestern Utah, covers 120 sq. m. and is famed for its *Rainbow Canyons*, so named for the colors of the chasms which here abound. Zion Canyon is a red and white gorge, of depth from 1,500 to 2,500 ft., cut by the Mukuntuweap River. Bryce Canyon became a national park (22 sq. m.) in 1928. It is a bowl of stone lace and filigree work presenting brilliant colors and strange likenesses. Mt. Carmel Highway, 25 m. long and costing over \$2,000,000, forms a spectacular road over part of the way between the two parks. Utah has many national monuments, among them Rainbow Bridge National Monument (50 m. n.w. of Kayenta) of pink sandstone, 278 ft. from pier to pier and rising 309 ft.; Natural Bridges National Monument (50 m. w. of Blanding) covering 2,740 acres; Dinosaur National Monument (n.e. corner of Utah) where fossilized skeletons are exposed to view. These monuments all lie in national forests. Utah has valuable mineral deposits. Copper is the leading mineral product. Utah ranks high in the production of sulphur and

of arsenious oxide, uranium and vanadium ores, and of potassium salts. Bismuth, cement, coke, gems and precious stones, gypsum, pig iron, manganese ore, manganiferous ores, calcareous marl, and petroleum are also produced.

The principal crops are hay and forage. Considerable attention is paid to orchard fruits. The diversion of the waters of some of the streams has been directly responsible for the development of several industries, among them that of beet-sugar, one of the most important in the State. The population of the state of Utah, according to the 1950 Federal census, was 688,862; this showed an increase of 138,552 people over the 1940 census. Urban population was 59.9 per cent.

In control of the public school system are a Superintendent of Public Instruction, elected for four years, and a State Board of Education, consisting of the State superintendent, presidents of the State university and the Agricultural College and six other persons appointed for four years by the governor and senate. The State maintains the University of Utah, at Salt Lake City, and the Utah Agricultural College, at Logan. The present constitution of Utah was adopted in 1895, preliminary to admission into the Union, and has since been amended in 1900, 1906, and 1908. The chief executive officers are the Governor, Secretary of State, Treasurer, Auditor, Attorney-General, and Superintendent of Public Instruction, each elected for four years. The earliest white visitors to what is now Utah were the Spaniards. In 1825 Great Salt Lake was discovered by Captain James Bridger, a trapper, and in the same year Fort Ashley, at Utah Lake, was built and temporarily occupied by about 120 men under William Ashley, of the Rocky Mountain Fur Company. The first settlement was made at Salt Lake City in July, 1847, by a band of about 150 Mormons under the leadership of Brigham Young.

Early in 1849 the state of Deseret was organized by the Mormons, with Brigham Young as provisional governor; and in March of that year a petition for statehood was presented to Congress by the provisional government of Deseret. On Sept. 9, 1850, an act was passed by Congress, organizing the Territory of Utah, with Salt Lake City as the territorial capital, and with Brigham Young as the first governor. The hostility of the Federal Government to the institution of polygamy began in 1852, when the revela-

tion relating to celestial marriage was made public. Because the Mormons refused to acknowledge the authority of the Constitution to prohibit polygamy, President Buchanan sent Federal troops into Utah, and in 1862 the practice was made punishable by fine and imprisonment. When in 1890 church property was declared forfeited, the church surrendered. On July 16, 1894, an enabling act for statehood was passed by Congress; a State constitutional convention met in March, 1895, and statehood was attained on Jan. 4, 1896. See W.P.A. Writers' Project, *Utah* (1941).

Utah, University of, a co-educational State institution at Salt Lake City, Utah, incorporated as the University of the State of Deseret in 1850.

Uterus, is a dilatation in the walls of the oviduct. In the human female the uterus or womb is a muscular, hollow organ, the purpose of which is to develop the impregnated ovum until the fetus has become sufficiently mature to exist outside of the mother's body. The fetus is expelled by muscular contractions of the uterus, at the time of parturition.

Utes, or **Utahs**, a tribe of North American Indians, one of the chief divisions of the Shoshone, formerly occupying parts of Colorado, New Mexico, California, Nevada, and Utah. Since 1850 they have been under the supervision of the U. S. Government.

Utica, an important Phœnician colony, founded about 1100 B.C. near Tyre, on the n. coast of Africa, in the district anciently called Zengitana, now Tunis.

Utica, city, New York, county seat of Oneida co., on the Mohawk River. Hamilton College and Colgate University are within a few miles of the city. In the production of knit goods, the city ranks high; p. 101,531.

Utilitarianism, an ethical system which makes 'the greatest happiness of the greatest number' the supreme end or criterion of conduct. Historically and theoretically utilitarianism has some connection with the Epicurean system of philosophy. Richard Cumberland (1631-1718) was the first philosopher to propound a system of utilitarianism; he was followed by David Hume (1711-76), who freed utilitarianism from the dogma that the motive of the agent is always egoistic and defended the altruistic tendencies of human nature; by Jeremy Bentham, who maintained that the attainment of the greatest possible happiness was the supreme in-

terest of every individual, and by John Stuart Mill, who emphasized the social character of moral feelings, claiming that disinterested public spirit should be the motive in the performance of all socially useful work.

Uti possidetis, Latin, as you (now) possess: in Roman law, a judicial decree conferring indisputable ownership on the actual holder of any property. In international law and diplomatic usage, a peace treaty qualified by this term awards outright to each belligerent whatever territory or property he may have conquered or captured during the course of a war.

Utopia, Sir Thomas More's ideal island, the site of his romance *De Optimo Reipublicæ Statu, deque Nova Insula Utopia*, published in Latin in 1516 and translated into English in 1551. The term Utopian is now applied to impossibly ideal schemes.

Utrecht, city, Netherlands, capital of the province of Utrecht on the Rhine; 22 m. s.e. of Amsterdam. The national University of the Netherlands, founded in 1635, has a great library, laboratories, and clinics, as well as an observatory. The headquarters of the Jansenist, or Old Catholic Party of Holland, have been here since 1723. Utrecht is the center of the Dutch railway system, and carries on a brisk trade in velvets, carpets, cottons, and linens. Machinery, chemicals, tobacco, bricks, and beer are manufactured; p. 165,028.

Uttar Pradesh, state of India, formerly known as United Provinces of Agra and Oudh. Area, 112,523 sq. m.; p. 56,346,456; capital, Lucknow. The region is exceptionally fertile, and the chief crops raised are wheat, millet, rice and other cereals, with some cotton, tobacco and sugar. The population is chiefly rural, but the following cities are above 100,000: Cawnpore, Lucknow, Agra, Benares, Allahabad, Bareilly, Meerut, and Moradabad. The greater part of India's early history took place in this region. In more recent years, the British came in the latter

half of the 18th century; the province of Agra was formed from Bengal in 1833; name was changed to North-West Provinces in 1835; Oudh was added in 1856; United Provinces of Agra and Oudh was formed in 1902; was placed under a governor in 1921; became an autonomous government with a two-chamber legislature in 1937; and became a state of the republic of India with name of Uttar Pradesh in 1950.

Uvula, a small conical prolongation depending from the middle of the lower portion of the soft palate. It frequently participates in inflammatory conditions of the throat and fauces.



Uvula.

1, Soft palate; 2, uvula; 3, tongue.

Uxmal, ruined city, Yucatan, Mexico, 40 m. s. of Merida. It has magnificent remains of Mayan structures, including arches, terraces, and temples, which are said to have been used by the Indians to the end of the 16th century.

Uzziah, or **Azariah**, king of Judah (c. 789-737 B.C.), was the son of Amaziah. He triumphed over Philistines, Arabs, Meunim, and made the Ammonites tributary; fortified Jerusalem; reorganized the army, and encouraged agriculture. Venturing to offer incense in the Holy Place, he was smitten with leprosy.

V. Until the 16th century, V and U were two forms of the same letter. They are now distinguished, and each has taken part of the duty performed by the undivided letter. U, for the most part, is restricted to the representation of vowels, and V is employed with a consonantal value; W also shares in the division. V in English and French is voiced *f*, the voiced lip teeth spirant. In German it has the value of *f* itself. The sound *v* is not liable to much variation.

V., versus=against; **vide**=see.

Vaal, river, South Africa, rises in Mount Klipstapel of the Drakenberg Mountains.

Vaccination, the inoculation in an individual of germs or their products in order to make the subject immune to a specific infectious disease. Until recently the word was applied to the inoculation of material to prevent smallpox only, or to render an attack mild. It was first advocated by Jenner, who in 1798 announced his discovery that those who by accident had become infected with cowpox—a disease whose relation to smallpox is not yet absolutely ascertained—became practically immune to smallpox.

Jenner taught that a single vaccination protected for life. Rarely is this true. Usually susceptibility to vaccinia returns, at latest, seven to ten years after vaccination.

Vaccine Therapy. The first in point of time, and still perhaps the most important of all vaccines, is that against smallpox. It was Pasteur who discovered that old dried cultures of the chicken cholera organism would produce immunity in fowls against a subsequent inoculation with virulent germs; and in his later work with anthrax and rabies he established the general principle that weakened or attenuated or killed cultures of microbes often have the power of conferring specific immunity, such as ordinarily follows only from a previous attack of disease. Vaccines made from living cultures are most efficient, but their use involves considerable risk, and killed cultures are commonly used in this country.

Recently, Besredka and Metchnikoff have obtained interesting and suggestive results by the use of sensitized vaccines, composed of living bacteria which have been immersed in their specific immune serums.

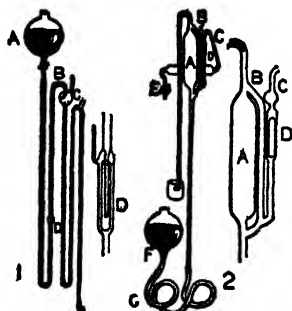
Vaccine therapy is at present valuable only for bacterial invasions which are purely local; it is of little or no value where there is a general invasion through the blood stream. The diseases which are now treated by vaccine therapy include skin diseases caused by staphylococci and streptococci, such as furunculosis, carbuncles, sycosis, acne and erysipelas, cystitis caused by the colon bacillus, various infections with the gonococcus, rhinitis, bronchitis, and otitis media. The most remarkable and striking results have been obtained in the treatment of acne and other cutaneous disorders of infective origin. A vaccine against whooping cough has been recently prepared from killed cultures of the Bordet bacillus which seems to have distinct value; and tuberculin treatment, although it has not realized the hopes once entertained for it, is a useful therapeutic agent in the hands of those experienced in its application. See TYPHOID FEVER.

Vaccinium, a genus of mostly hardy shrubs, bearing globose berries, often edible and of economic value, and including the Cranberry and Huckleberry.

Vachell, Horace Annesley (1861-), English author and dramatist. His published works include: *The Other Side* (1910); *Loot* (1913); *Quinneys'* (1914); *Spragge's Canyon* (1914); *Whitewash* (1920); *Virgin* (1929); *The Best of England* (1930); *The Fifth Commandment* (1932); *This Was England* (1933).

Vacuum is a term that should strictly be used to denote only space absolutely devoid of matter; it means literally 'emptiness.' Practically, however, it is impossible to produce an absolute vacuum by any means so far discovered. A vacuum can be obtained by inverting a glass tube about 34 inches long, filled with mercury, with its open end

in a bath of the same metal. This is called a *Torricellian Vacuum*, after Torricelli, the inventor of the mercury barometer.



Vacuum Pumps.

1. Sprengel pump: A, reservoir; B, inverted siphon; C, exhausted globe; D, air traps.
2. Toepler pump: A, pump chamber; B, side tube; C, gas entering tube; D, glass valve; E, stop-cock; F, reservoir of mercury; G, flexible tube.

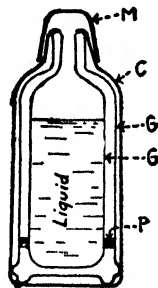
For the practical production of high vacua, some form of the mercurial air pump is commonly used. There are two chief types of this instrument, of which the Sprengel and Toepler pumps may be taken as examples. High vacua are best measured either by observing the character of the electric discharge in them or by means of the M'Leod gauge.

The ordinary manometer, in which the pressure is balanced against a column of mercury, becomes useless as soon as the pressure is reduced to less than about the one thousandth part of that of the atmosphere. The highest vacuum used in engineering practice (in the condensers of steam turbines) is about 29 inches of mercury—that is, the pressure is reduced to about one-thirtieth of the atmospheric. Much higher vacuums are obtained in vacuum tubes (e.g., the Crookes tube), the degree of vacuum being determined by observing the character of the electric discharge through them. The diffused glow produced by the electric discharge at fairly high vacua is put to practical use in the Moore vacuum-tube lighting system.

Vacuum Bottles, bottles with a vacuum jacket to prevent the conduction of heat through their walls. Dewar is credited with being the first to make practical use of a

vacuum as an insulation against the conduction of heat, when he devised a calorimeter in 1873 which was insulated by a vacuum jacket. Later, metal vessels with vacuum jackets were used for containing liquid air and other liquefied gases, until in 1893 the Dewar flasks of glass were introduced. These flasks were considered too fragile for any but laboratory use; but in 1904 Reinhold Burger, of Berlin, produced a vacuum bottle for general or household use.

Burger's bottle, like the Dewar flasks, had double walls of glass, being really one bottle within another joined together at the top. (See diagram.) The air was exhausted from the space between the walls to form the vacuum jacket. This bottle further resembled Dewar's flasks in having the facing sides of the two walls silvered to reduce the heat loss by radiation. The silvered surfaces act as mirrors to reflect any radiant heat endeavoring to either enter or leave the bottle.



Vacuum Bottle

M, Metal screw cap. C, protective metal casing. G, G, glass walls, between which is the vacuum jacket. P, asbestos-board pads.

Vacuum Cleaners, mechanical devices for sucking up dirt and dust from carpets, floors, and upholstery, by utilizing the tendency of the air to rush into a pipe in which a partial vacuum has been produced. The essential parts of a vacuum-cleaning equipment are the exhaustor or air pump, the cleaning tool or renovator, the hose and pipe line connecting these two, and the dust separator or reservoir for collecting the dirt. Many different types of air pumps are found in vacuum cleaners—ordinary reciprocating pumps, rotary pumps, turbine pumps, diaphragm pumps, fans, and aspirators having all been employed with more or less success.

Vacuum Engines are single-acting heat motors for small powers. Their principle is

that hot gases in the cylinder are cooled by contact with water-jacketed walls; a partial vacuum is thus formed within the cylinder, into which the piston is consequently forced, giving the engine its motive power.

Vacuum Tubes. The term vacuum tube as used to-day usually denotes some form of

imagine the tube of Fig. 1 to be filled with any common gas at a pressure of about $1/5$ millimeter of mercury. Upon application of a suitable potential between the electrodes (approximately 1000 volts) a luminous discharge fills the tube but divides itself into certain well marked sections. Upon the sur-



Fig. 1.

Simple form of Geissler tube showing: a, Crookes dark space; b, negative glow; c, Faraday dark space; d, positive column.

electric discharge device and it will be so understood here. Chief among the vacuum tubes employing gaseous conduction may be noted the familiar Geissler tubes, the small discharge tubes used in spectrum analysis, the gas-filled x-ray tubes, and certain photo-electric cells.

Geissler Tube.—In its simplest form the

face of the cathode lies a rather prominent but thin layer of luminosity. Depending somewhat on the pressure of gas and somewhat on the current density in the tube, this luminosity may or may not completely cover the cathode. Adjoining this thin luminous layer is a rather dark region to which the name 'Crookes dark space' has been given.

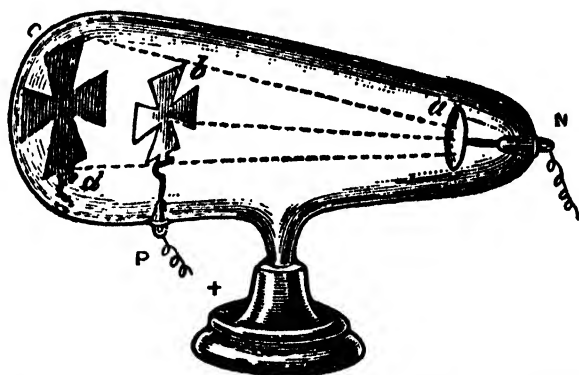


Diagram of a type of cathode ray tube designed by Sir William Crookes. Maltese cross b is made either of mica, glass or metal and due to the fact that it blocks the passage of cathode rays, the glass wall of the tube appears dark behind due to the absence of fluorescence.

Geissler tube consists of a glass tube, perhaps an inch in diameter and one to two feet long, in which, at each end, an aluminum electrode is sealed (Fig. 1). Pressure of the contained gas may lie anywhere between 10 millimeters of mercury and $1/1000$ of a millimeter, the character of the discharge being partly determined by the pressure. To obtain a picture of typical discharge conditions,

Adjoining this is a rather faintly luminous region of gas called the negative glow which, in turn, is followed by another dark region the 'Faraday dark space.' Between the Faraday dark space and the anode, the gas shows a rather brilliant luminescence known as the positive column. The positive column may either be unbroken or divided into layers or striations, depending largely upon

the gas pressure and the current density.

Kanalstrahlen and Lenard Rays.—That the ionized molecules are in rapid motion in the vicinity of the cathode of the discharge tube was shown by an experiment of Goldstein's in which he perforated the metal plate forming the cathode with the result that during discharge, streams of ionized molecules passed through the perforations and appeared as faintly luminous streaks in the

Photoelectric Cells.—The photoelectric cell had its origin in an observation of Heinrich Hertz, about forty-five years ago, to the effect that a spark would more rapidly jump between two electrodes in air when both, and particularly the negative electrode, were illuminated by ultra-violet light. The modern photoelectric cell, since it is usually designed to obtain a maximum electron emission for a given amount of incident light energy,

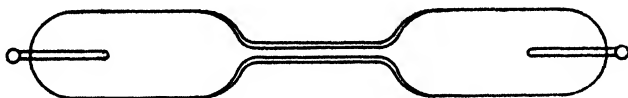


Fig. 2.

rear of the cathode. It has been possible to obtain a value for the speed of the Kanalstrahlen by measuring the Doppler effect which they display. The velocity as thus found agrees well with the velocity as calculated from the cathode fall of potential. Kanalstrahlen have the power of exciting fluorescence in many substances.

Quartz Mercury Vapor Lamp.—The radiation from mercury vapor is rich in ultra-violet light. When the discharge occurs in a quartz rather than a glass tube the ultra-violet light rays become available since quartz is quite transparent. Ultra-violet light is a powerful germicide and quartz discharge tubes have certain commercial uses for purifying water and in similar roles.

Tubes for Spectrum Analysis.—Tubes for spectrum analysis are frequently given such a shape as that shown in Fig. 2, the electrodes being separated by a section of glass

usually assumes the form of either Fig. 3 or Fig. 4. In Fig. 3, the light-sensitive material has a spherical shape and is located at the center of the spherical glass bulb, the internal surface of which is coated with silver. This silver mirror acts both to reflect incoming light upon the sensitive cathode

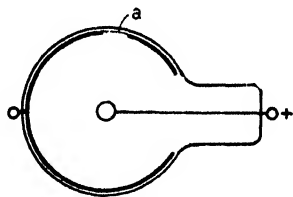


Fig. 4.

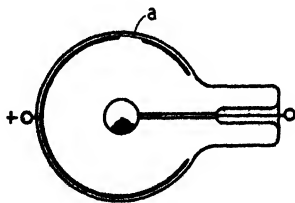


Fig. 3.

tubing of fine bore (of the order of a millimeter). When a discharge passes, the gas in the capillary glows with great brilliance and makes a good source of light for spectroscopic purposes. In making a spectrum tube great care must be exercised to preserve the contained gas in a pure state.

and to collect the liberated electrons, it being given a positive potential with respect to the cathode. In Fig. 4, the two electrodes are reversed, the sensitive metal surface being deposited upon the inside of the glass bulb, thus acting as its own mirror to throw the incoming light back and forth until completely absorbed. The anode, in order to present as little absorbing area to the light as possible, usually consists of a wire sometimes bent in the form of a ring.

X-Ray Tubes.—There are two types of x-ray tubes in common use, one depending upon gaseous conduction and the other upon thermal electron emission. A tube of the former type is shown in Fig. 5; the gas pressure within being such that the Crookes dark space extends out far enough to envelop the exposed end of the anticathode or target. When discharge passes, a beam of electrons liberated from the concave surface

of the cathode is focused upon the face of the target. Here they are abruptly stopped, resulting in the formation of x-rays. This is the method usually followed. X-rays have also been formed by using protons (hearts of hydrogen atoms) and alpha particles (hearts of helium atoms). The thermionic type of x-ray tube is similar to that shown

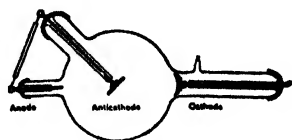


Fig. 5.

in Fig. 5, except that the anode is omitted, the target serving as the only anode, and the cathode is replaced by a coiled tungsten filament and focusing arrangement, the filament having separate leads so that it can be heated to incandescence from a properly insulated storage battery or transformer. In 1934, Wesley M. Coates and David H. Sloan, of the U. of California, with the aid of a new high power vacuum tube, succeeded in producing x-rays from mercury atoms.

Vaga, Perino Del (1500-47), Italian painter, whose real name was PIETRO BUONACCORSI, was born in Florence, and became a pupil of Ghirlandajo. He assisted Raphael in the decoration of the Vatican and in 1527 removed to Genoa, where his chief works, arabesques, are in the Doria Palace.

Vail, Alfred (1807-59), American inventor, was born in Morristown, N. J. While a student at the University of the City of New York, he became acquainted with Prof. S. F. B. Morse and subsequently undertook to secure patents for Morse's telegraphic instruments and to introduce the inventions commercially for a percentage of the profits.

Vail, Theodore (1845-1920), capitalist, was born in Ohio. His first association with the telephone industry came in 1878, and he later became president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company. He was influential in developing the telephone in South America.

Vaishnavas, in Hinduism, worshippers of Vishnu, in his incarnate form, either as Krishna or Rama.

Valais, Swiss canton, the third largest in the confederacy, with an area of 2,027 sq.

m. It is in the southern part and comprises the upper course of the Rhone and its tributaries; p. 137,741.

Valdes, Armando Palacio (1853-1938), Spanish novelist, leader of the naturalistic school, was born in Entralgo, Asturias. In 1881 he published his first novel *El Señorito Octavio*, followed in 1883 by *Marta y Maria*, by many considered his masterpiece. Other works are: *José* (1885); *Tristán* (1906); *La novela de un novelista* (1921); *Santa Rosalia* (1926); *Testamento Literario* (1929).

Valdosta, city, Georgia, county seat of Lowndes co. It is the seat of the Georgia State Woman's College. The city has cotton mills, cotton-seed and peanut oil mills, feed mills, grain elevators, lumber mills, turpentine and fertilizer plants, and machine shops; p. 20,046.

Valence, in chemistry, a measure of the capacity of the atom of any element for combining chemically with others. It is expressed as a number representing the number of hydrogen atoms replaceable by the given atom or with which it will combine. Valence is not concerned with the avidity of atoms nor with the energy involved in chemical reactions, but deals exclusively with the numbers of atoms. The hydrogen atom is taken as a unit, since no compounds are known in which a single hydrogen atom satisfies more than one atom of another substance.

The valence of any element is most easily determined by examining its compound with hydrogen. Many elements form more than one series of compounds, and possess a different valence in each series. Iron, for example, forms two series of compounds exhibiting valences of two and three; nitrogen is ordinarily either trivalent or pentavalent, but compounds are known in which it has valences of one, two, and four as well; the valence of manganese ranges from two to seven. This idea of valence, or capacity for combination, is at the very foundation of the theory of chemical reactions, and its explanation involves both the cause of atomic combination and the nature of the bond.

Valence, tn., France, capital of the department of Drôme. The printing of cotton and linen fabrics is an important industry, and there are manufactures of glass and silk; p. 30,964.

Valencia, a former kingdom of Spain, comprising the provinces of Castellon, Valencia, and Alicante. Wheat, rice, alfalfa, almonds, oranges, raisins, and mulberry trees

are cultivated, and industries include textile works, potteries, silk mills, and distilleries; p. 932,144.

Valencia, city, Spain, capital of the province of Valencia, on the Guadalaviar River. Interesting features are the University, founded in 1411 and reorganized in 1848-58; and the Alameda, a fashionable, tree-bordered promenade. Oranges, rice, melons, silks, and olive oil are exported. The leading industries are the manufacture of gloves, silk, tobacco, fans, and pottery; p. 353,000.

Valencia, city, Venezuela, capital of the state of Carabobo. It has a large export trade in coffee, sugar, hides, cacao, and cattle; p. 36,804.

Valenciennes (Lat. *Valentiana*), town, France. It is an old town and was famous in the 17th and 18th centuries for the manufacture of lace. The city is a famous beet-sugar market and has important iron and steel industries, and manufactures of hosiery and glass. In World War I it was abandoned during the retreat from Mons, 1914, and became German headquarters, suffering great industrial injury during four years of German occupation; p. 40,023.

Valens, Flavius (c. A.D. 328-78), emperor of the Eastern Roman empire from 364 to 378. Valens was an Arian and his reign was marked by severe persecution of the orthodox Christians.

Valentine, Saint, the name of several saints in the early church. The best known of them was a Roman priest, possibly identical with Valentine, Bishop of Spoleto, who was martyred Feb. 14, A.D. 271. Saint Valentine's Day is celebrated as a lovers' feast, and he is regarded as the patron saint of lovers. Hence, arose the custom of sending 'valentines,' missives or tokens of an amatory nature on Feb. 14. The practice is probably a pagan survival; some connect it with the old idea that the birds began to mate on this day.

Valentinian, the name of three emperors of Rome. **FLAVIUS GRATIANUS VALENTINIANUS I.** (A.D. 321-375), emperor from 364-375, was a native of Pannonia. On his accession he associated with himself his brother Valens, whom he made emperor of the East, while he ruled the Western empire. **VALENTINIAN II.** (371-92), younger son of the above, was chosen emperor with Gratianus, his elder brother. His domain included, ostensibly, Italy, Illyricum, and Africa, while Gratianus had Gaul, Spain, and Britain. **VALENTINIAN III.** (420-55), son of Constan-

tius III. by Placidia, was made emperor of the west by Theodosius II. in A.D. 425. During Valentinian's reign Carthage was taken by the Vandals under Genseric in 439, who thus won most of Roman Africa, and proceeded in 440 to ravage Sicily. In 451 Attila and his Huns were routed by Aëtius at Chlons-sur-Marne, but the following year they invaded Italy.

Valera y Alcalá Galiano, Juan (1824-1905), Spanish author and diplomat, was born in Cabra, Cordova. As a man of letters he stands foremost among his Spanish contemporaries. His first production, *Canciones, romances y poemas*, appeared in 1856, and was followed by the novels for which he is famous: *Pépila Jiménez* (1874); *Las ilusiones del Doctor Faustino* (1875); and *Juanita la Larga* (1896).

Valerian, whose full name was **PUBLIUS LICINIUS VALERIANUS**, emperor of Rome from A.D. 253 to 260. He recovered Antioch, which had been taken by the Persian Sapor in 257 A.D., and drove the Persians back beyond the Euphrates.

Valeric (or Valerianic) Acid, C_6H_5COOH , occurs in four isomeric varieties, two of which—viz., isovaleric acid and methyl-ethyl acetic acid—occur in plants such as valerian. The mixture of these two latter, which is generally known as valeric acid, is an oily liquid, with a persistent, unpleasant odor.

Valetta, or Valeтта, town, capital of the island of Malta and an important British naval and coaling station in the Mediterranean; p. 22,779.

Valhalla, in Scandinavian mythology, the great hall of the gods, the abode of warriors slain in battle. It was entered by 540 doors, through each of which 800 warriors could march abreast. The heroes engaged in fierce warfare with one another as their daily sport, but each day their wounds were healed before they sat down to feast with Odin.

Valhalla, a building near Ratisbon, erected (1830-42) by Ludwig I. of Bavaria, according to designs by Klenze, in honor of German patriotism and liberty.

Valkyries, in Scandinavian mythology, supernatural maidens of great beauty who chose the slain in battle for transportation to Valhalla and handed to the warriors their drinking-horns at their daily feast with Odin. The love of one of them, Brunhilda, and Siegfried is the theme of Wagner's opera *Die Walküre*.

Valladolid, city, Spain, capital of the

province of Valladolid. The city has a large trade in grain, an iron foundry, flour and woolen mills, and cloth factories. Valladolid was the capital of Spain under Philip II. and Philip III. It was the scene of the marriage of Ferdinand and Isabella and of the death of Columbus, and was at one time the residence of Cervantes; p. 78,819.

Vallandigham, Clement Laird (1820-71), American politician, was born in New Lisbon, Ohio. In 1856 he was declared defeated in a contest for a seat in the national House of Representatives, but before the close of the session he was able to secure the unseating of his rival, and was re-elected in 1858 and 1860. He was a bitter opponent of the anti-slavery party.

Vallee, Rudy (1901-), orchestra leader and crooner. He became popular as a saxophone player and leader of dance orchestras. He is a radio and vaudeville artist. In June 1936 he was made honorary master of arts by the Suffolk School of Law, Boston, Mass. Vallee is known as a skilful showman and discoverer of radio talent.

Vallejo, city, California. The city has flour mills, a tannery, fish-packing establishment, machine shops; p. 26,038.

Valley Forge, village, Pennsylvania. It is famous as the headquarters of General Washington during the winter of 1777-8, after the battles of Brandywine and Germantown and the British occupation of Philadelphia, when his army of 11,000 suffered dire privations. In 1893 the State Legislature of Pennsylvania created the Valley Forge Park Commission to acquire and improve this historic property and make of it a memorial park.

Valois, House of, a French dynasty which ruled from 1328 to 1498. The first king was Philip VI. (1328-50), who was followed by John II. (1350-64) and Charles V. (1364-80).

Valparaiso, city, Chile, capital of the province of Valparaiso, and chief seaport on the western coast of South America. The leading industries of Valparaiso are sugar refining, distilling, cotton and tobacco manufacture, and tanning. Valparaiso was founded in 1544 and was frequently the prey of English and Dutch corsairs. In 1822 an earthquake was felt for 1,000 miles along the coast. The city was again badly shaken in 1855, and on Aug. 16, 1906, the greater part of the business section was destroyed, with a loss of hundreds of lives; p. 209,945.

Valparaiso, city, Indiana. It is the seat of Valparaiso University. Manufactured products include mica, lumber, flour, paints, varnishes, and electrical specialties; p. 12,028.

Value, in the economic sense, is the power of goods to command other goods in exchange. It is not synonymous with price, which is an expression of value in the terms of a single commodity, as gold or silver. Value is affected by two factors, utility and scarcity.

To have value in the economic sense, a good must also be transferable, since only transferable goods can command other goods in exchange.

No article has absolute value; its value is relative to the value of other commodities. The relative scarcity and the relative utility of commodities determine their relative value. The business world is concerned with exchange value as determined by the various subjective values, and expressed in terms of money. See MONEY.

Valves, in botany, the two halves of which the microscopic unicellular plant known as diatom is composed.

Valves, contrivances for controlling the motion of a fluid along or through a passage.

Automatic Valves.—Various types of automatic valves are illustrated in Fig. 1. A. is a flap valve. A guard prevents the valve from opening too far. They are often fitted to suction pipes of pumps to prevent the water from draining out of the pump when it is not working. At B are two flap valves placed back to back, forming what is known as a double flap. C is a mushroom, disk or poppet valve. It consists of a brass disk sitting on a brass seat, usually conical, but sometimes flat. C₂ gives the plan and section of an ordinary mushroom valve; the valve C is shown with an arrangement to facilitate closing, consisting of three rubber rings separated by washers, a certain amount of lift usually being allowed before the rings begin to act. F is an india-rubber disk valve. It consists of a circular plate of rubber resting on a gun-metal grid, and held at the center by a bolt, a saucer-shaped guard-plate limiting the rise of the rubber disk. This type of valve is much used for air pumps of condensing engines. G represents a ball valve, a type often used for small high-speed pumps.

Non-automatic Valves.—Fig. 2 represents an ordinary stop valve to be opened and closed by hand. It consists of an ordinary

lift valve, raised and lowered by a screwed spindle working in a nut.

Reducing Valves.—Fig. 3 shows a valve for reducing the pressure of a gas below the pressure of supply. It consists of a double-

et. (Fig. 4.) There is a hole through the plug, which coincides in one position with the passage in the socket. By rotating the plug the blank portion is brought opposite the hole in the socket, and blocks the passage.

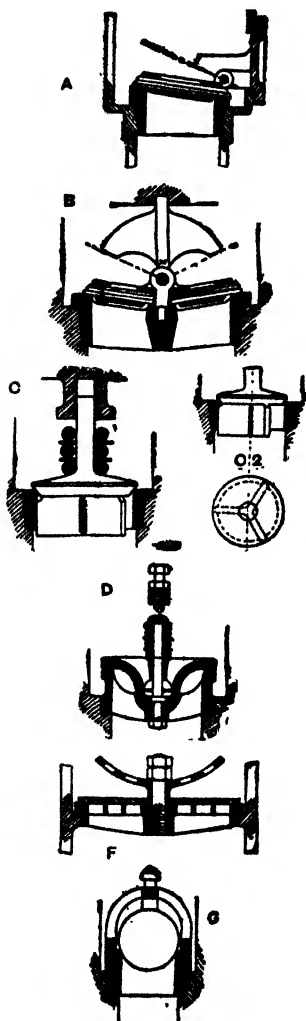


FIG. 1.

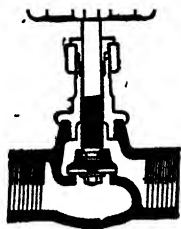


FIG. 2.—Stop Valve

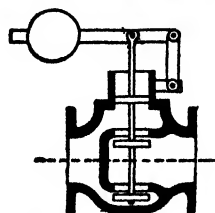


FIG. 3.—Reducing Valve

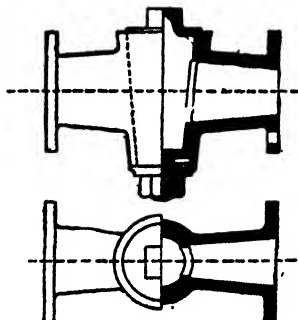


FIG. 4.

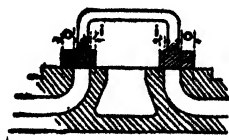


FIG. 5.

beat or equilibrium valve, worked by a piston, the piston being loaded by means of a weighted lever.

Cocks are valves consisting of a conical plug, fitting in a corresponding seat or sock-

Slide Valves.—A slide valve of the D type, shown in Fig. 5, was at one time largely used in steam engines of both the locomotive and stationary types. Although slide valves were balanced in many cases as the pressure in-

creased, they have been largely replaced by the piston valve, as in Fig. 6, especially for locomotive use. Slide valves of the D type are still used in some pumps and in air brake apparatus to some extent.

Valve Gear.—The Stephenson link motion, Fig. 7, was designed for use on locomotives and was used almost exclusively up to about 1900. The Joy valve gear (Fig. 8) was originally designed for both marine and locomotive

uses, while the body of the vampire grows plump and ruddy; his blood is in a fluid state, and often the coffin in which he was buried is found to be filled with blood.

Van, chief town of the vilayet of Van, Turkey; p. 22,549.

Van, Lake, a large lake in the Turkish Republic, near the Kurdistan border, some 5,600 feet above the sea. Its waters are extremely blue and contain a large

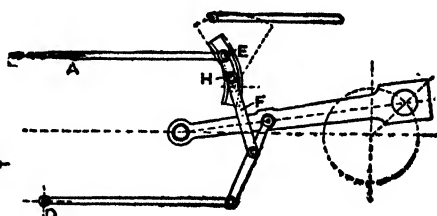
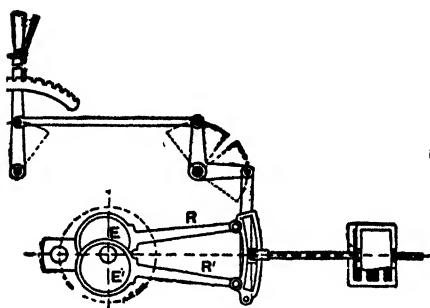


Fig. 7. Stephenson Link Motion. Fig. 8. Joy Valve Gear.

tive use. It has practically disappeared from the locomotive but is still used in marine work. The valve gear now in greatest use is the Walschaert or some modification thereof. A typical Walschaert valve gear is shown in Fig. 9.

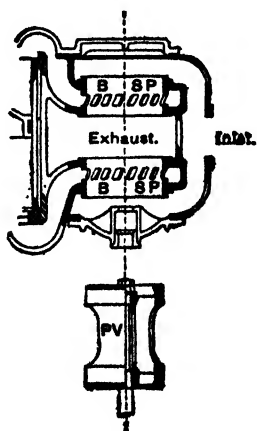


Fig. 6.

Vampire, in early Slavic folklore, a corpse which rises from its grave at night and visits sleepers, whose blood it sucks. The victim becomes pale and thin and after a few days

amount of potassium and sodium carbonates.

Vanadium, V, atomic weight, 51.0, is a somewhat rare metallic element, whose principal ore is vanadinite, a lead chlorovanadate, found in Ariz., Col., Utah and the Adirondack region. Metallic vanadium may be obtained by heating vanadium chloride in a current of hydrogen, when it is obtained as a gray, infusible metal. The metal is not known in commerce, but forms an essential ingredient of the chrome-vanadium and other alloy steels so important to modern industry.

Vanbrugh, or **Vanburgh**, **Sir John** (1664-1726), English dramatist and architect, was born in London. His first play, *Relapse*, appeared in 1697, and was followed by *The Provok'd Wife* (1697); *The False Friend* (1702); *The Mistake* (1705). In 1701 Vanburgh built Castle Howard, and in 1705 drew up plans for Blenheim House.

Van Buren, city, Arkansas, county seat of Crawford co. It is a shipping point for lumber, cotton, farm produce, and fruits; p. 6,413.

Van Buren, **Martin** (1782-1862), eighth president of the United States, was born on Dec. 5, 1782, in Kinderhook, Columbia co., N. Y., of Dutch ancestry. He was elected to the State Senate as a Clintonian, serving until 1820. In the U. S. Senate he advocated the tariff acts of 1824 and 1828, showing a

decided leaning toward protection. At the elections of 1828 he was regarded as chief manager for General Jackson and was himself elected governor of New York. He served as governor from Jan. 1, 1829, to March 12, and then took up his duties in Washington. While serving as secretary of state, he conducted the negotiations which led to the payment of the Spoliation claims by France. He was on the ticket with Jackson in 1832; was unanimously nominated for the presidency in May, 1835 and elected. See UNITED STATES: *History*.

natural harbor, open the year around. Vancouver is a natural outlet for the grain of the prairie provinces, of which it handles great quantities. It has also flour mills, sugar refineries, lumber mills, railroad shops, canneries, fish-packing establishments, iron works, and manufactures of jute; p. 344,833.

Vancouver, city, Washington. The region is devoted to lumbering, fruit growing, and dairying. Vancouver was founded by the Hudson's Bay Company in 1828; p. 41,664.

Vancouver Island, part of the province of British Columbia, Canada, lies off the Pa-

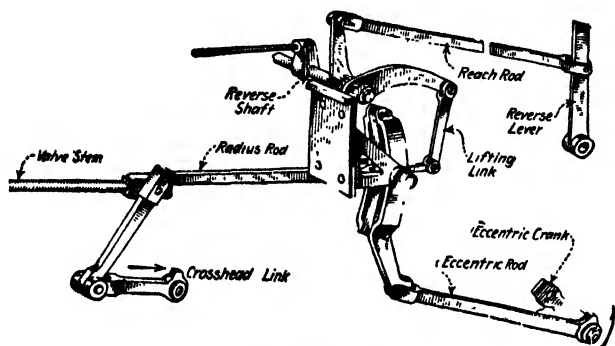


Fig. 9. Walschaert Valve Gear.

Vance, William Reynolds (1870-1940), American educator and writer on legal subjects, was born in Middletown, Ky. He was dean of the law school at the University of Minnesota from 1912 to 1920, when he became professor of law at Yale. He also acted as secretary (1905-10) and president (1910-11) of the Association of American Law Schools and was General Counsel for the Bureau of War Risk Insurance (1918-19).

Van Cortlandt, Philip (1749-1831), American soldier, was born at Cortlandt Manor, Westchester co., N. Y. He became a member of the New York legislature, and of the convention which ratified the Federal Constitution; and during 1793-1809 occupied a seat in the Federal House of Representatives.

Van Cortlandt, Stephanus (1643-1700), American colonial statesman, was born in New Amsterdam. He became mayor of York City in 1677, and was for many years a judge of the court of common pleas. In 1686 he was appointed commissioner of the revenue, and in 1700 was chief justice of the colony.

Vancouver, city, Canada. It has a fine

cific Coast. The interior is rugged and rocky, and the bold coast line is indented by many deep fiords and bays, forming numerous natural harbors. Gold, copper, and iron are found on the island, but coal is the most important product. Victoria is the chief town; p. 38,441.

Vandals, a Germanic tribe, probably closely akin to the Goths. They overran Gaul, and committed all the excesses of barbaric devastation which have made their name proverbial. In 409 they passed into Spain, and in 422 took Seville and Carthage, and gave their name to Andalusia.

Vandenberg, Arthur Hendrick (1884-1951), Republican Sen. from Mich. 1928-51.

Vandenberg, Hoyt S. (1899-1954), Amer. air force general. Reveals use of atomic weapons against ground troops (1952).

Vanderbilt, Cornelius (1794-1877), American capitalist, was born in Port Richmond, Staten Island, N. Y. He gained control of what was known as the Gibbons Line and as time went on his business broadened until he was the chief steamship owner in the United States, with vessels plying to Central America, San Francisco, and Europe. In 1864

he secured control of the Hudson River line, and later of the New York Central. He was the founder of Vanderbilt University.

Vanderbilt, Cornelius (1843-99), American capitalist, son of William H. Vanderbilt, was born in New Dorp, Staten Island, N. Y. Upon the death of his grandfather, Cornelius Vanderbilt, he became first vice-president of the New York Central Railroad, and in 1886 president of the Harlem Railroad.

Vanderbilt, George Washington (1862-1914), American capitalist, son of W. H. Vanderbilt, was born in New Dorp, Staten Island, N. Y. He gave to New York City the Thirteenth Street Branch of the Free Circulating Library and to Teachers College its present site.

Vanderbilt, William Henry (1821-85), American capitalist, son of Cornelius Vanderbilt, was born in New Brunswick, N. J. He became associated with his father's greater railroad holdings, and on the death of the latter (1877) became president of the New York Central system, which he greatly extended.

Vanderbilt University, a coeducational institution in Nashville, Tennessee, incorporated as Central University in 1872. The next year Cornelius Vanderbilt contributed \$500,000 for its foundation, subsequently increasing his gift to \$1,000,000. Thereupon the charter was amended, and the name of Vanderbilt University was assumed by the new institution.



Frank A. Vanderlip.

Vanderlip, Frank Arthur (1864-1937), American financier, was born in Aurora, Ill. He served as Assistant Secretary of the Treasury from 1897 to 1901, was vice-president of the National City Bank, New York City, from 1901 to 1909 and president, 1909-19. He has written *American Commercial In-*

vasion of Europe (1902); *What Next in Europe* (1922).



Henry Van Dyke.

Van der Stucken, Frank (1858-1929), American musical conductor and composer, was born in Fredericksburg, Tex. In 1884 he succeeded Damrosch as musical director of the Arion Society of New York and in 1895 settled in Cincinnati as director of the College of Music and conductor of the Symphony Orchestra. His compositions include *Te Deum* (1875); an opera, *Vlasda* (1884); *Inauguration March and Festival Hymn* (1888); a symphonic prologue, *William Ratcliffe* (1890); *Pax Triumphans* (1900).

Van Devanter, Willis (1859-1941), American jurist and Associate Justice of the United States Supreme Court, was born in Marion, Ind. In 1897 he was appointed by President McKinley assistant attorney general of the United States. In 1903 he was appointed by President Roosevelt a Circuit Judge of the United States for the Eighth Circuit; and in 1910 was appointed by President Taft an Associate Justice of the United States Supreme Court. He retired in 1937.

Van Doren, Carl (1885-), American editor and writer, was born in Hope, Ill. He became literary editor of *The Nation* in 1919 and later of the *Century Magazine*. He was editor of the *Literary Guild* (1926-1934). His published works include *The Life of Thomas Love Peacock* (1911); *The American Novel* (1921); *Swift* (1930); *Modern American Prose* (1934); *Benjamin Franklin* (1938).

Van Doren, Mark (1894-), American poet, was born in Hope, Ill. He was literary editor of *The Nation* (1924-28). His published works include *The Poetry of John Dryden* (1920), *Spring Thunder and Other Poems* (1924), *Jonathan Gentry* (1931), *The Tran-*

sients (1935), *A Winter Diary* (1935).

Van Dyck, Sir Anthony (1599-1641), one of the most eminent of Flemish portrait painters, was born in Antwerp. His religious paintings, most of which are in Antwerp, Vienna and Munich, comprise a *Christ on the Cross*, a *Pieta*, *Bewailing Christ* and various *Madonnas*.

Van Dyke, Henry (1852-1933), American clergyman, author, educator, and diplomat, was born in Germantown, Pa. He was pastor of the Brick Presbyterian church, New York City, from 1883 to 1900, and again in 1902 and 1911, and was professor of English literature at Princeton, 1900-23. In 1913-17 he served as United States Minister to the Netherlands and Luxemburg.

His writings include *The Golden Key* (1926); *Even Unto Bethlehem* (1928).

Van Dyke, John Charles (1856-1932), American art critic and teacher, was born in New Brunswick, N. J. He became professor of art history at Rutgers College, and lectured at Columbia, Harvard, Princeton.

Vane, Sir Henry, The Younger (1613-62), English author and statesman, was born in Hadlow, Kent. He went to America in 1635, became governor of Massachusetts (1636), but having lost his popularity with the colonists by advocating religious toleration and taking the part of Anne Hutchinson, he was not re-elected, and returned to England (1637). Through Vane's influence and aid Roger Williams, in 1643, obtained the charter of Rhode Island.

Van Eyck, Hubert (1366-1426), and **Jan** (1381?-1441), brothers, both Flemish painters; were acclaimed as inventors of oil painting. Their most famous work was the altarpiece *The Adoration of the Lamb*, which they gave to the cathedral of St. Bayon, in Ghent. Their work shows brilliancy of color.

Van Gogh, Vincent (1853-1890), Dutch painter, was at first an art dealer, then a preacher; he was deeply interested in social work. In 1882 he began study of art at Antwerp Academy, and in 1886 he went to Paris to take up impressionist art. His best work was done at Arles. He used very vivid colors, which gave exceptional brilliance to his paintings. Among his works is *Mairie au 14 juillet*.

Vanilla, a genus of climbing tropical orchids, which bear thick leaves, and spikes or racemes of large fragrant flowers. The most important species is *V. planifolia*, grown in the West Indies, Java, and other tropical islands.

Van Loon, Hendrik Willem (1882-1944), American writer, was born in Rotterdam, Holland. He served as war correspondent in various European countries during the Great War. In 1917-18 he was professor of modern European history in Cornell University and in 1922-3 was professor of history at Antioch College, Ohio. His published works include *The Story of Mankind* (1921); *Life of Peter Stuyvesant* (1928); *Van Loon's Geography* (1932); *The Story of the Pacific* (1940); *Invasion* (1940); *Van Loon's Lives* (1942).

Vannes, seaport town, France. The chief industries are shipbuilding, oyster-fishing, and manufacture of ropes, woolen, linen, and cotton goods, and leather; p. 21,402.

Van Rensselaer, Killian (1595-1644), Dutch merchant, born in Amsterdam. He acquired s. of what is now Albany an immense tract of land almost equal in extent to the three modern counties of Albany, Rensselaer, and Columbia, and erected the first and largest of the famous 'patroonships.'

Van Rensselaer, Stephen (1764-1839), American politician, born in New York City. He was one of the patroons of Rensselaerwyck. He was interested in the Erie Canal from its inception, was a member of the canal commission in 1816-24 and its president in 1824-39. He was a member of Congress in 1823-29. The Rensselaer Polytechnic Institute, at Troy, was founded by him in 1824, and he was for many years a regent and chancellor of the University of the State of New York.

Van Sweringen, Oris Paxton (1879-1936), American railroad magnate. With his brother, Mantis J., he acquired control through holding companies of more than 21,000 miles of track valued at \$3,000,000,000 from the Atlantic Coast to the Rocky Mountains. The brothers were advocates of a project for grouping all the country's railroads in one main trunkline system.

Van't Hoff, Jacobus Henricus (1852-1911), Dutch chemist, born at Rotterdam. To Van't Hoff physical chemistry as a distinct branch largely owes its existence. In 1901 he was given the Nobel prize for chemistry.

Vapor. See **Gases**.

Var, maritime dep. of S.E. France. Wine, tobacco, and fruit are produced; and paper, silk, and soap are manufactured. Cap., Draguignam; chief place, Toulon; p. 330,000.

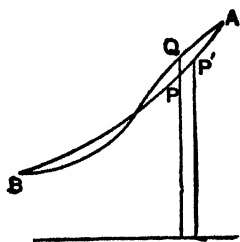
Vardar, river in Yugoslavia and Greece; length about 200 m. During World War I

the Varder valley was the scene of two important battles; p. 18,000.

Vare, William S. (1877-1934), American politician. Master of the Republican machine of Philadelphia, he was elected to the United States Senate in 1926, but the Senate refused to seat him on the ground of excessive campaign expenditures. Vare was credited with swinging the Presidential nomination to Herbert Hoover in 1928, by casting Pennsylvania's vote for him at the Republican national convention.

Variable Stars are those which fluctuate in light to the extent of at least half a magnitude. Through comparisons of photographs taken at different epochs, crowds of variables have been discovered.

Variation. (1.) In biology, any deviation from type, whether as regards structure or function, seen in plants or animals. There are two main modes of scientifically studying variation. The first is by taking a very large number of individuals of a particular species and investigating these in detail as regards one special character. This is known as the statistical or actuarial method of study. The second (or experimental method) consists in the breeding of organisms on a large scale, the variations which appear in the course of the experiment being studied for successive generations. (2.) In music, a device in composition which consists in altering the melody or harmony of a simple theme so that at each repetition it appears in a new but still recognizable form.



Calculus of Variations.

Variations, Calculus of. The principles underlying this difficult branch of mathematics may be illustrated by the following special case. Let there be two points not in the same vertical line, and let it be required to find the curve down which a body will slide in the least time. There must evidently be a curve down which the body will slide in a time that is at least not longer than the time down any other curve. Let APB represent

this curve of shortest time—this brachistochronic path, as it is called—and let AQB be any neighboring curve, Q being vertically above P . We can evidently pass to the curve AQB from the curve APB by varying the height of each point. This is clearly a kind of differentiation; but it is not a differentiation of the usual kind, such as the variation in the height of P would be if the transition were to P' , a neighboring point on the same curve. Hence to distinguish it from differentiation along a curve we call it a variation from one curve to another. Now if APB is the path of shortest time, the quantity which expresses this time must be increased when we pass by variation to any neighboring curve. The problem to be solved is then to find the form of the curve APB such that any change in the form will increase the time of sliding down it. The calculus of variations supplies methods for effecting the solution.

Varicose Veins are veins increased in length, in calibre, and at first in the thickness of the vessel walls. In severe cases they become tortuous, knotted, and finally thin-walled. Almost any impediment to the circulation predisposes to varix, and occupations which necessitate prolonged standing are extremely conducive to the condition. A modern method of successful treatment consists of a series of injections of a liquid into the affected area.

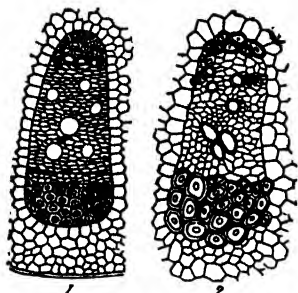
Varna, fortified seaport, Bulgaria, on the Black Sea. There is a considerable trade in cattle, butter, skins and grain. The Russian fleet bombarded the town during the World War I; p. 60,000.

Varnish, a solution of resin (spirit varnish) or resin and drying oil (oil varnish) in a volatile liquid, such as alcohol or petroleum spirits. Varnishes are used to coat surfaces with more or less hard, transparent, and usually glossy, films.

Varro, Marcus Terentius (116-28 B.C.), the most famous of the Romans for learning, was born at Reate. His most important works were satires, mock tragedies, poems, and *Antiquitates Rerum Humanarum et Divinarum*.

Vascular System, in anatomy the entire arrangement of vessels operative in the circulation of the fluids of the body both sanguineous and lymphatic. It comprises the heart, the arteries, the capillaries, the veins, and the lymphatics. In flowering plants, and also in certain flowerless plants fluids containing nourishment are largely distributed to all parts of the plant by means of certain

tubes collected in bundles, known as fibro-vascular bundles.



Vascular System in Plants.

1, Fibro-vascular bundle of melon (exogenous); 2, Fibro-vascular bundle of palm (endogenous).

Vases, hollow vessels, usually of a decorative nature. Fine specimens of glazed or enamelled earthenware were manufactured by the ancient Assyrians, Egyptians, Romans, Etruscans, and Greeks, as well as by mediæval artists. The enameled vases of Persia stand midway, in point of technique, between earthenware and true porcelain. The art appears to have been lost for many centuries, as it is only in the 11th century that the white-glazed vases of the European continent become conspicuous.

Vassal. See **Feudalism**; **Fief**.

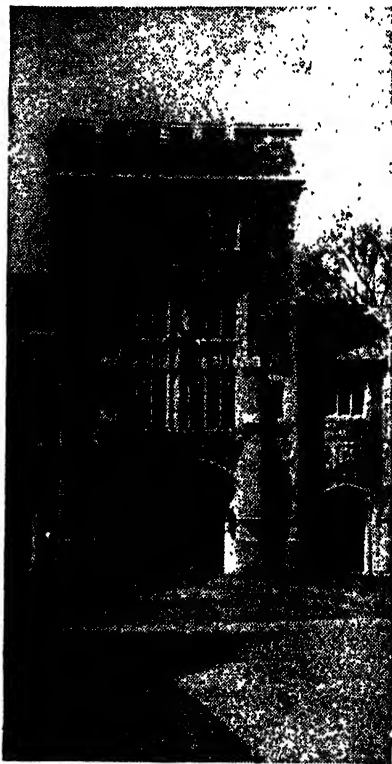
Vassar, Mathew (1792-1868), American philanthropist, was born in Norfolk, England. Matthew established a brewery by which he acquired a large fortune. In 1861 he incorporated Vassar Female College, now Vassar College.

Vassar College, an institution for the higher education of women in Poughkeepsie, N. Y. It was incorporated in 1861 as Vassar Female College by Matthew Vassar, who gave the site and an endowment fund of about \$800,000. In 1867 the name was changed to Vassar College. In 1923 the trustees voted to restrict the number of students to 1,150, continuing a policy of limitation established in 1905.

Vatican, Palace of the, the residence of the Pope in Rome and the home of some of the most famous art treasures in the world. It was originally a simple dwelling house erected by Pope Symmachus in the fifth century. Subsequent Popes added to the original structure, and by the beginning of the fourteenth century it had assumed the por-

portions of a palace. The present palace covers an area of between thirteen and fourteen acres on the Vatican Hill, n. of St. Peter's Cathedral. It is a group of buildings containing some 20 courts and about 1,000 halls, chapels, and apartments.

From the main entrance to the Vatican, on the Piazza di San Pietro, the Scala Regia, a magnificent stairway built by Bernini for Alexander VII., leads to the Sala Regia. From its entrance is gained to the Sistine Chapel (1473-81), where all papal ceremonies are held. Frescoes by the most celebrated Florentine and Umbrian artists of the time adorn the walls, and the ceiling, by Michelangelo, is by some authorities regarded as the highest achievement of modern art; on the altar wall is his vast composition *The Last Judgment*. On the floor above the Sistine Chapel are Raphael's Stanzas, four rooms which once



Vassar College: Gate Tower.

served as the papal apartments, adorned with frescoes by Raphael and his pupils and associates. Other of Raphael's works are the magnificent Raphael tapestry intended orig-

inally for the walls of the Sistine Chapel, with designs taken from the history of the New Testament and executed in Brussels in wool, silk and gold, and a number of paintings in the Picture Gallery founded by Pius VII.

The Vatican collection of antiquities, which is the finest in the world, is housed in the Museo Pio-Clementino, the Galleria Chiaramonti, the Braccio Nuovo, the Egyptian Museum, and the Etruscan Museum. The library of the Vatican is established in twenty-five rooms in addition to the great library hall. It now contains over 250,000 volumes and over 34,000 MSS., among the latter many of great value.

in attendance. Its great work was the ratification of papal infallibility as an article of faith.

Vaucluse, dep. of S.E. France. Agriculture is the chief industry; wine is produced; and paper, linen goods, silk, and chemicals are manufactured. The capital is Avignon. Petrarch lived for sixteen years at Vaucluse, 15 m. e. of Avignon, composing many of his finest poems to Laura, and writing or beginning most of his other works; p. 230,000.

Vaughan, Herbert (1832-1903), English cardinal, Roman Catholic archbishop of Westminster. The principal event of his occupancy of the chair was the erection of the cathedral at Westminster.



Audience by Pope Pius XI, in Vatican.

Vatican City is a state of 108.7 acres, comprising St. Peter's, the Vatican Palace and Museum, the Vatican Gardens, and other buildings and land used by the Holy See, within the territory of Rome. It was created by the Lateran Treaty which became effective on June 7, 1929, between the Pope and the Italian Parliament and king. This treaty settled the Roman question which had been a source of difficulty since 1871, when the Pope, losing by the creation of the united Kingdom of Italy his temporal power in Italy, withdrew to the Vatican where he declared himself a 'prisoner' and from which he never emerged to set foot on Italian soil. The state is independent, its sovereign the Pope, its civil government under officials of his appointing, and its population numbering about 1,000. Within it was set up in 1930, under the direction of Marconi, a wireless station from which the Pope broadcasts to the world.

Vatican Council, a council held in Rome in 1869-70, at a summons of Pope Pius IX. Seven hundred and sixty-four prelates were

Vault, an arched ceiling or roof, composed of brick or other material resisting compression, the stress produced being supported by abutments.

Vauvenargues, Luc de Clapiers, Marquis de (1715-47), French philosopher, born at Aix in Provence. He achieved immediate fame with his first book, *Introduction à la Connaissance de l'Esprit Humain* (1746).

Vaux, Calvert (1824-95), American landscape gardener and architect, born in London, England. He came to the U. S. in 1850, and in 1858 formed a partnership with Frederick Law Olmsted, in association with whom he made the plans for New York's Central, Riverside and Morningside parks, Prospect Park in Brooklyn, the State Reservation at Niagara Falls, and parks in Bridgeport, Conn., Chicago, and elsewhere. He made the plans for the New York Metropolitan Museum of Art, and the Museum of Natural History.

Vaux, Richard (1816-95), American geologist, born in Philadelphia. In 1842 he was appointed inspector of the Pennsylvania

state penitentiary. Vaux improved penitentiary methods, and acquired a reputation as a penologist through his numerous reports on the state prisons.

Vauxhall, a once famous and fashionable public garden at Lambeth, London, was opened in 1660, and existed till 1859.

Veblen, Thorstein B. (1857-1929), an American economist, taught at the University of Chicago, Leland Stanford, and the University of Missouri. He was managing editor of the *Journal of Political Economy* from 1896 to 1905; teacher in the School for Social Research, New York City, from 1918 to 1927. Publications include *The Theory of the Leisure Class*; *The Theory of Business Enterprise*. Consult Dorfman's *Thorstein Veblen and His America* (1934).

Vector, in mathematics, the name given to any quantity which involves direction as well as magnitude. The simplest example is the position of one point with respect to another, obviously fully represented by the straight line joining them.

Vedanta, a system of ancient Hindu philosophy, the object of which is an inquiry into the true nature of the human soul.

Vedas, the oldest sacred literature of the Hindus, are written in Sanskrit, and are supposed to have been composed by a succession of poets from about 1500 to 1000 B.C. They are divided into four parts—*Rig-Veda*, *Yajur-Veda*, *Sâma-Veda*, and *Atharvâ-Veda*. These poems embody the earliest religious conceptions of the Hindus, and throw some light on the ancient history and social condition of the Indo-Aryan race.

Vedism, a term applied to the religion which is summed up in the Vedas, from which sprang Brahmanism, and through it Hinduism.

Veery, a popular name for the Wilson's, or tawny, thrush.

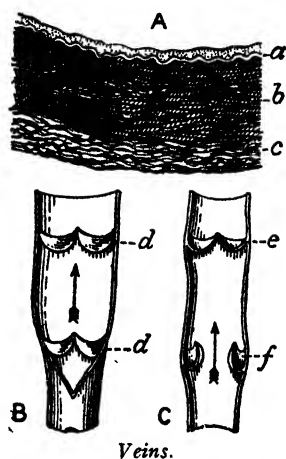
Vega, Garcilaso de la (1503-36), Spanish poet. His Petrarchian sonnets are the finest in the Spanish language. He was the first to popularize the Italian sonnet in Spain, and the first to write an ode in Spanish.

Vegetarianism. Of vegetarians, some reject all animal foods (even eggs, milk, and butter); others abstain only from foods whose production involves the destruction of living animals; while a third group consists of those who allow themselves such foods as are procurable without unnecessary suffering or pain—net-caught fish.

Veins, in anatomy, are elastic tubes by which blood is borne from the periphery to-

wards the heart. They are distinguished as systemic, pulmonary, or portal. Pulmonary veins carry oxygenated blood from the lungs; systemic veins carry venous blood from the tissues; the portal vein conveys blood laden with food products from the alimentary canal to the liver, in which it ramifies like an artery.

Veins, in geology, a fissure through any kind of rock that by some subsequent action has been filled or partly filled with other mineral matter. If the vein is filled with originally molten igneous material it is called a dyke; if the filling carries deposits of the precious metals it is often called a lode.



Veins.
A. Transverse section of wall of a vein. B. Vein laid open, showing valves. C. Section of vein with valves open and closed. *a*, inner coat (epithelial and subepithelial layers); *b*, middle coat (muscular tissue); *c*, external coat (areolar tissue and elastic fibres); *d*, two pairs of valves; *e*, valves closed; *f*, valves open.

Velasquez, or Velazquez, Diego de (c. 1640-c. 1522), governor of Cuba, born in Cuellar, Spain. He accompanied Columbus on his second voyage to the New World; and assisted in the conquest of Hispaniola. During 1511-13 he conquered Cuba, and founded Baracoa, Bayamo, Puerto Principe, Santiago de Cuba, Havana, and other places.

Velasquez, Diego Rodriguez de Silva y (1599-1660), the greatest of Spanish painters and one of the greatest of all painters,

was the representative in art of the dignified, aristocratic national types. In 1623 Olivares, the great minister, invited him to Madrid, and persuaded the king to sit for his portrait. Velasquez then became the favorite of Philip iv.; was elected court painter, and held various offices at court. In his own country his influence was not wide; but he has become the dominating influence of schools of French, English, and American artists. In 1623 Charles I. of England, then Prince of Wales, sat to him. In 1648 he went to Italy, commissioned by Philip to buy pictures in order to form a Spanish academy. While in Rome he painted the magnificent portrait of Innocent x.

Velloro, munic. town and military station, India. It was defended by the British against Haidar Ali in 1780-2. In 1806 the Sepoy soldiers at Velloro mutinied, and massacred the European officers and residents; p. 49,700.

Vellum. See **Parchment**.

Velocity is primarily the rate of change of position of a moving point, but it is also applied to the rate at which a state or configuration passes along among particles. It is a vector quantity, and is completely specified when the direction of motion is given as well as the speed or rate at which space is being described. The speed or amount of velocity is measured by dividing the length passed over in a short time by the time taken.

Velvet, a textile stuff, usually of silk, smooth, on one side, but sometimes double-faced, with on the other a close, erect nap or pile, formed by the interweaving on brass wires of a second warp, the loops of which, cut or uncut, form the velvet. In inferior grades it may be made of cotton and silk; other materials are also used. Appearing later than silk, satin, damask, cloth of gold, it marks the end of the Gothic and the advent of renaissance art. In the United States velvets are made in Connecticut.

Velvet Ant or **Cow Ant**, one of the small, black or red, filose insects of the hymenopterous family Mutillidæ, which much resemble ants, but are more closely allied to the wasps, and are provided with a powerful sting.

Venable, Francis Preston (1856-1934), American educator and chemist, born in Prince Edward co., Va. Among his writings are: *Manual of Qualitative Analysis* (1883); *Radio-activity* (1917); *Zirconium and its Compounds* (1921).

Vendée, La, dep. of W. France. La Vendée was famous for the stubborn re-

sistance of its people to the revolution (1793-4); p. 395,602.

Vendetta, a hereditary bloodfeud between families or tribes. The practice still survives among the Corsicans and Sardinians, and in parts of the United States.

Veneer. Beautifully grained or figured woods are cut into thin slices called veneers. The process of veneering consists in glueing the veneer to thicker wood.

Vener, or **Wener**, the largest of the Swedish lakes, in the southwestern part of the country, is 290 ft. deep, and 2,300 sq.m. in extent.

Venereal Diseases embrace three distinct contagious disorders which are usually contracted and transmitted by impure sexual intercourse: *Simple* or *Soft Chancre*, sometimes called local venereal sore; *Syphilis*; *Gonorrhea*.

Venesection, or **Phlebotomy**, an operation for the abstraction of blood from an incised vein.

Venezianov, Alexander (1779-1845), called the Father of Russian painting. When genre was considered the lowest grade of art, Venezianov turned to the depiction of peasant life.

Venezuela, United States of, republic, South America, lying along the n. coast of the continent. The total area is estimated at 393,976 sq. m.; p. 5,440,000. Venezuela has three natural divisions: a mountain and valley region, including most of the coast and n.w. portion which comprises most of the cultivated land; the plains of the Orinoco (100,000 sq.m.); and the Highlands of Venezuelan Guiana (200,000 sq.m.). The rivers number over 1,000, eight of which are of the first magnitude. The Orinoco system alone accounts for 436 of these, several of which are themselves great rivers.

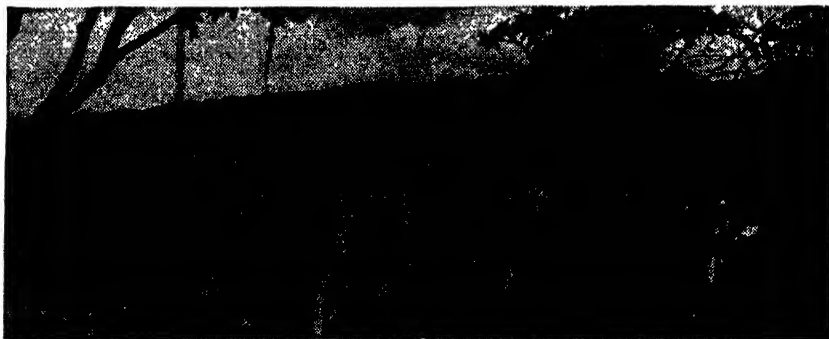
The principal lake is Lake Maracaibo (8,392 sq.m.), on the n. coast. La Guayra is the chief port, and is connected by rail with Carácas. Other important ports are Maracaibo, Puerto Cabello, Carúpano, and Ciudad Bolívar on the Orinoco. On account of the variations in altitude, Venezuela has a wide range of climate. The rainfall is especially heavy in the central, eastern, and northern portions of the Llanos. The great variation in climate exerts a wonderful influence over the plant life. In parts of Guayana the growth ranges from alpine shrubs and reindeer moss to bamboos and orchids. On the plains the iris, palm, and cashew nut are found; in the coast region, the cactus, croton, and man-

grove. In the warmer altitudes of the north are grown coffee, cocoa, sugar, tonka, and bananas; while a little higher up in the mountains are intermingled peaches, oranges, apples, strawberries, carnations, roses, violets, and tropical flowers. In the forest country of Guayana are the cedar, mahogany, dyewood, indigo, and Venezuelan rosewood; in the mountains, the pine, tree fern, ivy, cranberry, yew, and alpine grasses and shrubs.

The forests are populated with many varieties of monkeys; in the mountains are found the jaguar, puma, ocelot, jaguarondi, margay, vampire, 'spectacled' bear, and many deer; while horses, donkeys, and cattle roam the plains in a semi-wild state. The sloth and ant-eater are found in the valleys. Reptiles are numerous, most of them large and highly colored, and only a few poisonous. The best known include the anaconda, boa, rattlesnake,

On the Llanos, and in the Orinoco region, stock raising is a profitable industry. Primary education is free and compulsory since 1870, for all children over the age of seven. Higher education is provided in Universities at Mérida and Carácas. The republic is divided into 20 states, a Federal District, and 2 territories. The president exercises executive power through his cabinet of 8 ministers, who are appointed by and responsible to him. Carácas is the capital. In 1520 the Spaniards made the first European settlement on the American continent, at Cumaná.

In 1830 Venezuela seceded and formed an independent republic, with Paez as first president. Venezuela has had several revisions in its Constitution and many revolutions since the first Constitution was adopted. In 1915, Gomez was elected president. He was re-elected for 1922-29. In 1929 he declined re-



Caracas, Venezuela.

coral snake, and 'bushmaster.' Venezuela is very rich in minerals. The principal mineral resource is petroleum. Other important minerals are asphalt, gold, and copper. The wealth of Venezuela is derived mainly from agriculture. The country is said to be entirely self-contained. Almost every kind of climate is available for almost every kind of crop—tropical produce on the low-lying coast regions, fruits and temperate plants on the highlands of the interior. Coffee, the chief agricultural product, grows at elevations of 1,600 to 6,500 ft. and even higher. Cocoa is the next important agricultural product. Sugar is grown in the Maracaibo district and in Valencia, Barquisimeto and Carácas; about one-half of the crop is shipped to the United States. Almost the whole yield of tobacco is used in local manufacture of cigars and cigarettes. Cotton grows in all the warm regions.

election but, by an amendment to the constitution, the office of Commander-in-Chief was created and Gomez was elected to that office with the powers of a virtual dictator. In 1931, Gomez reassumed the presidency. In fact Gomez had been dictator of Venezuela since 1908 and in 1935 the country was the only one in South America that had not suffered a revolution during the world depression; it had no foreign debt; its taxes were remarkably low. Gomez died December 17, 1935, and Gen. Eleazar Lopez Contreras succeeded him. The new federal constitution, enacted by Congress in 1936, provided for a basic labor law calling for compulsory compensation insurance, recognition of trades unions and collective bargaining, an eight-hour day, and a law requiring banks to keep 80 per cent of their deposits invested at home. Venezuela broke with the Axis in 1941.

Venice (Italian *Venezia*), a city and

fortified seaport of Italy, stands on 3 large and 114 small islands in the Venetian Lagoon; p. 286,000. The city is intersected by 150 canals, over which there are about 400 bridges. The Grand Canal, 2 m. long and 77 yards wide, is crossed by three bridges, including the famous Rialto (1588), and is lined with the most noted palaces of Venice. A magnificent group of buildings is around the Piazza and Piazzetta of San Marco. On the east side is St. Mark's Cathedral, richly decorated with mosaics, at the front of which are the four famous gilded bronze horses, brought from the Arch of Titus in Rome. Just south of the cathedral is the Doge's Palace (now used as an art gallery), which is connected with the prison in the rear by the famous Bridge of Sighs (1605). In 1933, Venice was connected with the mainland by a bridge $2\frac{1}{2}$ m. long.

Venice is the second city of Italy in the value of its transit trade, and has long been noted for the manufacture of art goods. There are numerous glass factories, making mirrors, mosaic, and beads, on the island of Murano, and there is a thriving lace industry on the island of Burano. The manufacture of silks, tapestry, furniture, jewelry, artificial flowers, and candles, is also carried on. The marches and islands of the lagoon at the n.w. end of the Adriatic were first inhabited by refugees from the barbarian invaders of Italy. The Veneti took refuge here in the fifth century and established a number of island communities, each of which maintained a comparatively independent existence until the 12 'townships' agreed to elect one supreme magistrate, the 'Doge.' Venice dominated the Adriatic, and gradually absorbed most of the trade of the world, sending her ships as far as England for wool and to the Black Sea for furs, while her merchants penetrated to India and China.

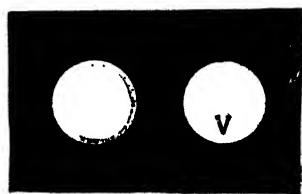
The fall of Constantinople (1453), involved a terrible struggle with the Turks. The struggle lasted until 1718, when the Morea, the last of the eastern possessions, was lost. Venice had meanwhile sunk into political insignificance, though she maintained her independence until she had to submit to Napoleon (1797). After the fall of Napoleon, Venice fell to Austria, and it was not until 1866 that she was united to the Italian kingdom.

Veni, Creator, Spiritus, an invocation to the Holy Ghost. The Veni Creator is used in the English Orinai at ordination of priests and at consecration of bishops. The Roman Church uses it also at papal consecrations.

Venizelos, Eleutherios (1864-1936), Greek patriot, was born in Crete. At his suggestion a Revisional Assembly was called, to which he was elected Aug. 10, 1910, succeeding to the premiership Oct. 13. While in office he secured the adoption of a new constitution and the establishment of the right of Cretan delegates to sit in the Greek Chamber; and under his guidance Greece passed successfully through the two Balkan Wars. His persistent demand for alliance with the Entente in the First World War caused his retirement in 1915. Retiring to Crete, he there established a revolutionary Government which was recognized by the Allies Oct. 16, 1916. Upon the abdication of Constantine and the accession of his son Alexander, June 12, 1917, Venizelos was at once recalled as premier. He represented Greece at the Peace Conference, in 1919.

In the elections of 1920 he was defeated and came to the United States, returning to Greece in 1924 on the abdication of King George. In 1928 he again became premier till 1932, thereby preventing the threatened conflict between Royalists and Anarchists. In 1933 an attempted assassination of the premier resulted only in increasing his influence in some parts of Greece. Two years later he led an abortive revolt from Crete, fleeing to France when the movement was suppressed. His career was aided materially by his wife, who was reputed to possess a fortune of \$15,000,000.

Ventilation is the process of replacing vitiated air in any enclosed space, as a room, a mine, or a building, with pure air. There is a difference of opinion as to the amount of air to be provided per person, but 30 cubic feet per person per minute is generally considered as giving good ventilation and this amount is required by law in school buildings of New York and other States.



*Earth and Venus (V)
Compared.*

Ventriloquism is the art of producing the voice in such fashion that the sound ap-

pears to proceed from a source other than the speaker's mouth. This is done by taking a deep inhalation of breath, and then allowing it to escape slowly; the sounds of the voice being modified by the muscles of the throat and palate. The illusion is heightened by immobility of the visible muscles concerned in speech, as well as by gestures and glances which suggest to the onlooker a false source of the sound.

Venue, a legal term signifying the county or other jurisdiction in which an action may properly be brought to trial, though not necessarily the jurisdiction in which the facts giving rise to the action occurred. The plaintiff names the venue in commencing his action, but the defendant may apply for a change of venue on various grounds.

Venus, originally a Roman goddess of spring and the patron of flower gardens, was later identified with the Greek Aphrodite and thus became the Roman goddess of love and beauty. She was a favorite subject for the sculptor's art, the best known statues of her being the Venus de Milo and the Venus de Medici.

Venus, the second planet from the sun, known to the ancients, under its two aspects of morning and evening star, as Phosphorus and Hesperus. Venus is the brightest of the planets. Venus has no satellite. Transits of Venus across the sun are obscured when inferior conjunction occurs near one of the nodes of her orbit, the sun, planet, and earth, being then nearly in a line. The first recorded transit of Venus was that observed by Horrocks and Crabtree, on December 6, 1639, the companion event in 1631 had escaped notice. The next pair took place at the opposite node in June, 1761, and 1769, and excited world-wide attention; for Halley had, meanwhile, in 1679, pointed out the availability of these occurrences for determining the distance of the sun. The next pair of transits are due on June 8, 2004, and June 6, 2012.

Venus de Milo, a famous statue, the chief treasure of the Louvre; considered by many the most beautiful example of ancient sculpture. It was discovered by a peasant farmer in a grotto on the isle of Melos, in May, 1820.

Veracruz, a state of Mexico in the southeastern part. The surface is mountainous, rising gradually from the coast to the Sierra Madre Mountains, which run from n. to s. in the western part. The climate is cool and pleasant in the uplands, but hot and moist along the coast. The soil is fertile and Vera

Cruz is the most important agricultural state in Mexico; p. 1,376,865. Jalapa is the capital.

Vera Cruz, chief seaport of Mexico, and principal city of the province of Vera Cruz, is situated on the Gulf of Mexico. There has been constructed a fine harbor; p. 123,368. On April 21, 1914, following President Huerta's refusal to comply with President Wilson's demand for a formal salute to the American flag, U. S. marines were landed at Vera Cruz, and occupied the city until Nov. 23.

Verbena, a genus of herbaceous plants belonging to the order Verbenaceae, chiefly American. They are common garden annuals with gay flowers in bloom throughout the summer months.



Common Vervain (*Verbena officinalis*).

Vercelli, town, Novara province, Piedmont, Northern Italy; p. 31,903.

Vercelli Book, or **Codex**, an Old English manuscript in the cathedral library at Vercelli, was discovered in 1832, though how it found its way to Italy is unknown. The handwriting is of the 11th century.

Vercingetorix, an ancient Gaulish chieftain, who in 52 B.C. raised a rebellion against Caesar.

Verdi (Fortunio) Giuseppe (1813-1901), the greatest of Italian opera-compos-

ers, was born in Le Roncole, in the duchy of Parma. His first opera, *Oberto*, was successfully performed in 1839. In 1849 he founded in Milan, in memory of his wife, a home for aged musicians. Verdi was a great admirer and close student of Wagner but in no sense an imitator. His best known works are *Rigoletto*; *Il Trovatore*; *La Traviata*; *Aida*, the most popular of all his operas.

Verdict, the determination of a jury at a trial upon the issues submitted to them. The unanimous concurrence of all the members of a jury is necessary to render a verdict.

Verdigris, a mixture of basic acetates, prepared by the action of crude acetic acid on copper. It varies from blue to green.

Verdun, town and fortress, department of Meuse, France. Prior to the First World War, which witnessed its destruction, Verdun was a town of about 22,000 population, with manufactures of hardware, leather, liqueurs, and confectionery. From the beginnings of the World War in August, 1914, Verdun was a German objective. It was the meeting place of the great road from Paris eastwards and the highway which followed the Meuse; it was the junction of five railway lines, and was only a day's march from the German frontier and the fortress of Metz.

Verdun was fortified with an inner line of redoubts—Belleville, St. Mihiel, Belrupt, La Chaume, and de Regret. Beyond this an outer line of forts and batteries was pushed out in a circuit of some 30 miles. The first month of the war, which saw the famous *degringolade de fortresses* ('fall of the fortresses'), put Verdun in dire jeopardy. Hastily it was attempted to construct entrenchments far in advance of the forts, but the work had scarcely begun before the Crown Prince was at its gates. German failure at the Marne compelled the general retreat of the invader.

Verdun, Battles of. In January, 1916, the Allies seemed in a favorable position for the campaign of the New Year, having considerably increased their strength in men and material. Germany and Austria were confronted by two alternatives: to stand, as before, on the defensive in the West, and look to the East for a decision; or to attack in the West, and then turn in triumph to Russia. The arguments leaned in favor of the second. Under these conditions Verdun was chosen as the objective. It was in the area of the Crown Prince's command, so that its fall would raise the waning prestige of the dynasty. It would be possible to present to the German people and to the neutral nations the

news that the most famous fortress of Eastern France, the key of the Eastern gate, had fallen to the valor of German arms.

The first step was a gigantic concentration of artillery, brought from interior factories and the Eastern front, and consisting mainly of the more mobile howitzers. By the middle of February at least 13 new divisions had appeared mysteriously in the West, located in and around the Champagne, Argonne, and Lorraine fronts. It was an extravagant concentration on a section which did not exceed 20 miles. On the 20th of February the French line lay 9 miles north of the city, and 8 miles to the east. It was a strong position and in the early winter of 1914 Sarraill had labored to make it impregnable. A network of wire had been stretched at all points of danger, gun positions were carefully chosen and cunningly concealed, sheltered roads were constructed, the old forts were dismantled and their guns used to arm the outer lines. It was a pronounced salient, and therefore was at once a threat to the German front and a temptation to their attack. All supplies and reinforcements for the lines on the heights must cross the bridges of Verdun and go through its gates.

The bombardment of the small northern sector chosen for this unparalleled drive began on the morning of Feb. 21, 1916. The French first lines were wiped out. The destruction was cataclysmal. The German infantry advanced in its wake on a six-mile front but their waves were unexpectedly opposed from ditches and the very shell holes and ruins created by their own guns. Every wood, knoll, gully was fought for inch by inch; but, outnumbered, sometimes ten to one, the French had been forced to retire. There was a moment when the fate of the Allies hung in the balance. To withdraw would mean abandoning all this region down to St. Mihiel, but a stand on the new line could be made at a minimum risk. Joffre seems to have disregarded the broader issues, to have leaned to such a retirement. Reserves were rushed from other sectors and sent into action on the night of Feb. 26. Balfourier's already famous Iron Division counter-attacked along the whole of Douaumont Ridge, successfully defended Haudremont, and swept the Germans from every position except the fort itself. Verdun was still in French hands and the German High Command had no illusions as to what it might cost to reach it, but discontinue the campaign they dared not. Even a draw would make them a laughing-stock.

Furious was the fighting to the west of the Meuse. For two days and a night the struggle continued with nothing less than ferocity. Assault followed assault from March 10 to March 22 but the French could not be dislodged, the invaders being driven out on April 3 in one of the most spectacular engagements of the year. There were further German gains, slight but significant, during July and August, but the final attack promised by the Crown Prince never materialized. Six months of steady hammering had not carried him forward as many miles. It brought about his temporary eclipse, for Verdun was registered as a colossal failure. The final stage occurred during the summer of 1917. At the

(1889), and *Bonheur* (1891) were his most notable succeeding works.

Vermeer, Johannes, or Jan van der Meer (1632-75), Dutch painter, was born in Delft, and was greatly influenced by Pieter de Hoogh. His paintings—mostly portraits, *genre* pictures, landscape and town views—are in Amsterdam, Berlin, and Paris.

Vermillion, a variety of mercuric sulphide, HgS. Vermillion is a brilliant scarlet, very heavy solid, which when finely ground makes a beautiful and permanent pigment.

Vermont (popularly called the 'Green Mountain State'), one of the New England States. The surface of Vermont is generally upland, broken by mountain and high hills,



Verdun Battlefield, France.

instance of Pétain, now Commander-in-Chief of all the French Armies, the attack was resumed on the west of the Meuse. From the brook of Forges, close to Le Mort Homvie, was launched Pershing's great Meuse offensive. See EUROPE, WORLD WAR I.

Vergennes, Charles Gravier, Count de (1717-87), French statesman, was born in Dijon. On the accession of Louis XVI. Vergennes was appointed (1774) successor to D'Aiguillon at the foreign office, and on the outbreak of the war between Britain and her American colonies, he brought about the alliance between France and the new United States.

Vergil. See *Virgil*.

Verlaine, Paul (1844-96), French lyrical poet, was born in Metz, and from youth was passionately devoted to the worship of beauty in all its forms. In 1881 appeared *Sagesse*, a series of religious odes and lyrics, which take rank with the best work of Christina Rossetti. *Romances sans paroles* (1874), *Jadis at naguère* (1884), *Amour* (1888), *Parallèlement*

and by deep, narrow valleys. The central topographical feature is the range of the Green Mountains, a member of the Appalachian system, which extends across the State from s. to n. Mount Mansfield is 4,393 ft. The climate of Vermont is characterized by long and severe winters and bright, temperate, and pleasant summers.

The granite industry leads the mineral industries. There is also marble. Hay and forage is by far the most important crop. Maple sugar and sirup and potatoes constitute important products. Industrial establishments working in marble, granite, slate and other stone products normally employ one-fifth of the total number of wage earners and produce one-fifth of the total value of manufactured products for the State. According to the Federal Census 1950, the population of Vermont was 377,747. The population of the principal cities in 1950 was: Burlington, 33,155; Rutland, 17,659; Barre, 10,909; St. Albans, 8,037; Montpelier (the capital), 8,599. The Commissioner of Education, appointed by the

State Board of Education, has general supervision of public schools. Each town has a board of three directors, who in cities and larger towns appoint superintendents annually. The State helps to maintain the University of Vermont and State Agricultural School at Burlington. Other institutions of higher learning are Middlebury College, and Norwich University, Northfield. Bennington has a progressive college for women, founded in 1932.

The present constitution of Vermont was adopted in 1793, and has since been frequently amended. The chief executive officers are the Governor, Lieutenant-Governor, Secretary of State, Attorney-General, Treasurer, and Auditor, elected by the people for two years. The Lake Champlain region was explored in 1609 by the French under Champlain, though an earlier claim to ownership was established by the visit of Cartier in 1535. The early history of Vermont is concerned chiefly with the incidents relating to the 'New Hampshire Grants.' The charters of New Hampshire and of the Massachusetts Bay Colony were both interpreted to include the southern part of the Vermont territory, thus causing a conflict of claims, which was settled in favor of New Hampshire.

The king, who was called upon to settle the dispute between the Colonies, decided in favor of New York. New Hampshire eventually withdrew her opposition, and New York was bought off in 1790 for \$30,000 as indemnity for land claims; and on Feb. 18, 1791, Vermont became a State—the first admitted under the Federal Constitution. A new State constitution was adopted in 1793, and in 1808 Montpelier was made the capital. In the Revolutionary struggle Ethan Allen and his Green Mountain Boys fought daringly. In 1929 Champlain Bridge was completed. Consult WPA Writers' Project, *Vermont* (1941).

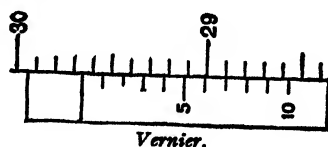
Vermont, University of, a State institution for both sexes at Burlington, founded in 1791.

Vermouth, or **Vermuth**, a mildly bitter liqueur or cordial, used as a stimulant to the appetite. It is an infusion of bitter and aromatic herbs in sweet white wine which has had sufficient alcohol added to bring the proportion up to 15 per cent. The bitter principles used are mainly wormwood, centaury, and bitter orange peel, in equal parts.

Verne, Jules (1828-1905), French author, was born in Nantes. Most of his works have been translated into English. Among them are: *Twenty Thousand Leagues Under*

the Sea, Around the World in Eighty Days, Michael Strogoff.

Vernier, an auxiliary scale, invented by Pierre Vernier (1580-1637), which enables us to read the very smallest divisions of a graduated scale. It is indispensable in theodolites, sextants, and all mountings of telescopes for accurate determination of angular positions; also in barometers, cathetometers, and other instruments for measuring length.



Vernis-Martin ('Martin's lacquer'), the name of a lacquer in imitation of Chinese and Japanese work, made by the brothers Martin, French furniture makers of the 18th century. The famous lacquer of transparent green used by them was a skillful adaptation of existing varnishes; and while not equal to the real Oriental lacquer, exhibits the finest work in Europe.

Verona, fortified city, capital of the province of Verona, Venetia, Italy, on the Adige; 72 m. by rail w. of Venice. The city is rich in fine palaces of sculptured marble, some with frescoed walls dating back to the 13th century. There are numerous statues, towers, and elaborate tombs, and some notable bridges. The Gothic Cathedral dates from the 12th century, and contains a fine *Assumption* by Titian; p. 86,578. Verona at one period led Italy in art, and was the home of a school of painting whose importance was reflected in the name of Paul Veronese.

Veronal—chemically, diethylmalonyl urea, $(C_2H_5)_2C[CO.NH]_2.CO$ —is used in medicine as a hypnotic. With some patients it produces an eruption, and other symptoms of poisoning, and in large doses has caused death.

Veronese, Paul, the cognomen of **Paolo Cagliari** (1528-88), Venetian painter of processional, ceremonial, and festival pictures, was born in Verona. He was called to Venice in 1555 to decorate the Church of San Sebastiano; and much of his best work is to be seen there on the ceilings and walls, the altar, the organ, and the doors. Through Titian's influence the Senate commissioned him to assist in decorating the Library (now the Royal Palace) and the Ducal Palace. Here he painted *Venice Enthroned*, the *Apotheosis of Ven-*

ice, and many other works before his death. The huge *Marriage at Cana* is now in the Louvre. Veronese stands in the forefront of great colorists. He sought to master the problems of light and shade associated with color; the relation of visible things to one another, and to their environment in light. Consult Ruskin's *Modern Painters*; Caliar's *Paolo Veronese* (1904); Bell's *Paolo Veronese* (1905).

Veronica, a genus of herbaceous and shrubby plants, belonging to the order Scrophulariaceae. The flowers are usually borne in axillary or terminal racemes, and range in color through the blues, purples, and white. Several species are naturalized, as the beautiful blue-flowered germander, speedwell, or bird's eye (*V. chamaedrys*). Others are the decumbent *V. officinalis*, which bears slender racemes of lilac flowers in summer, and the American brook-lime, with large conspicuous flowers (*V. americana*), found in brooks.

Veronica, the name of one of the women of Jerusalem who, according to 13th or 14th century tradition, followed Jesus on his way to crucifixion. Taking pity on His fainting condition she wiped the sweat from His face with her handkerchief, which is said to have retained the imprint of the Holy Face. The alleged portrait is now in Rome, where it is said to have been since about 700. It is exhibited in Holy Week. Its possession has also been claimed by Milan and other places. The name 'Veronica' appears to have been originally that of the portrait itself (*vera icon*, 'a true picture'), not of a woman.

Verplanck, Gulian Crommelin (1786-1870), American essayist and Shakespearean critic, was born in New York City. He was graduated (1801) from Columbia University, studied law and practiced for a time in his native city, then visited Europe, and on his return entered the field of politics. He was elected to the New York legislature in 1820, from 1821 to 1825 occupied the chair of the evidences of revealed religion at the General Theological Seminary, was U. S. congressman from 1825 to 1833, and was in the State senate during 1838-41. From 1855 until his death he was vice chancellor of the State University. From 1828 to 1830, with Bryant and R. C. Sands, he edited *The Talisman*, an annual. Besides political pamphlets, orations, and miscellaneous essays he published *Essays on the Nature and Uses of the Various Evidences of Revealed Religion* (1824), and *Shakespeare's Plays with his Life, with Critical Introduction and Notes* (3 vols., 1847).

Verrazano, Giovanni da (c. 1480-c. 1527), Florentine explorer about whom little is known. At about 1521 he seems to have been a corsair in the service of France, known as Juan Florentin, or Florin, preying upon Spanish commerce. In 1524 he commanded a French expedition which explored the American coast from Cape Fear southward and then northward to Newfoundland, and discovered Narragansett and New York Bays.

Verres, Gaius, Roman administrator who was quaestor in 82 B.C., and city praetor in 74. He governed Sicily for three years (73 to 71 B.C.) and apart from his tyranny and oppression, his rapacity was such that he is said to have done enormous harm to the island. He seized every statue or object of art of any value and on his departure the Sicilian people besought Cicero to prosecute him for extortion. He was condemned, and retired to Marseilles, and in 43 was proscribed by Mark Anthony, who envied his treasures.

Verrill, Addison Emory (1839-1926), American zoölogist, was born in Greenwood, Me. He was graduated from Harvard in 1862, and in 1871 was placed in charge of the U. S. Fish Commission's deep-sea dredging operations. In 1864-1907 he was professor of zoölogy at Yale. He was also curator of zoölogy in Peabody Museum in New Haven, Conn., and in 1868-70 was professor of comparative anatomy and entomology in the University of Wisconsin. His monographs cover a wide field of biological investigations, including molluscs, anellids, corals, echinoderms, anthozoa, tunicata, bryozoa, and cephalopoda.

Verrocchio, or Verocchio, Andrea del (1435-88), the name assumed by ANDREA DE' CIONI, Florentine goldsmith, sculptor, architect, and painter, was born in Florence. He seems to have been a pupil of Donatello. In 1471 he executed the bronze mausoleum of Giovanni and Pietro de' Medici for the sacristy of San Lorenzo; and in 1476 he produced *Young David*, now in the National Museum of Florence. Among his other works are the bas-relief of the *Decapitation of John the Baptist*, the bronze equestrian statue of *Colleoni* (at Venice), the silver altar in the baptistery of San Giovanni, the group of the *Unbelief of St. Thomas* in the oratory of San Michele, and the tomb of Bruni in Santa Croce. His most celebrated pupils were Leonardo da Vinci, Botticini and Perugino, who executed most of his designs for him. Among his best paintings are *Baptism of Christ*, the *Annunciation* in the Uffizi, and *Madonna and*

Two Angels in the National Gallery, London.

Versailles, town, France, in the department of Seine-et-Oise; 12 m. s.w. of Paris. It is chiefly known because of the famous palace built by Louis XIV. at a reputed cost of \$200,000,000. Three great avenues, St. Cloud, Paris, and Sceaux, converge in the imposing Place d'Armes, which separates the palace from the town. The palace comprises a central block fronting which are the Cour Royale and the Cour d'Honneur, adorned with statues, and two long wings on the n. and s. The central part contains the state apartments, private royal apartments and the famous Galerie des Glaces. The wings contain long corridors adorned with statuary and paintings by Boucher, Watteau, David, Delacroix and many others, the chapel and the theatre.

The gardens, which are beautiful, but somewhat stiff, were planned by Le Notre. They contain lovely fountains, statuary, groves, waterfalls and ponds. Beyond the present park are the two Trianons, the *Grand Trianon* built as a retreat for Louis XIV. and the *Petit Trianon* erected as a residence for Marie Antoinette. The town itself is well laid out, and is the seat of a bishop. The leading industries are market gardening and distilleries. Louis XIV., Louis XV. and Louis XVI., and their courts resided at the palace. Here William I. of Prussia was proclaimed emperor in 1871; here the capitulation of Paris was signed, and here in 1919 the Allies and Germany signed the treaty ending World War I; p. 68,575.

Versailles, city, Kentucky, county seat of Woodford co., on the Louisville and Nashville, and the Southern Railroads; 12 m. w. of Lexington. It is the seat of St. Leo's parochial school, Margaret Hall, Diocesan School for Girls, Cleveland Orphan Institution, and the Logan Helm Memorial Library. The surrounding district produces grain and tobacco, and is noted for the breeding of horses. The city contains flour mills; p. (1919) 2,268; (1920) 2,061; (1950) 2,760.

Versailles and Paris, Treaty of, the treaties that ended the War of the American Revolution. In negotiating with England the American commissioners, owing to a belief that the French ministry was working counter to their interests, disregarded their instruction to act in concurrence with France. The preliminary treaty was signed on Nov. 30, 1782 (12 months after the surrender of Cornwallis), by Richard Oswald, commissioner for Great Britain, and by John Adams, John Jay, Henry Laurens, and Benjamin Franklin, com-

missioners for the United States. The definite treaty, however, was not concluded until Sept. 3, 1783, when it was signed at Paris by David Hartley, representing Great Britain, and by all the Americans above mentioned except Laurens. The independence of the United States was acknowledged, and Great Britain relinquished to the Americans vast territory stretching westward to the Mississippi between Florida on the south and Canada on the north. The Americans were guaranteed the right on favorable terms of catching fish in Canadian and Newfoundland waters. The navigation of the Mississippi River, the source of which was supposed to be in British territory, was to be open to the ships of both countries. Debts owed by Americans to British subjects were to be paid, and Congress was to recommend to the States that they restore the confiscated estates of the Loyalists and refrain from further measures against them. Neither party carried out the terms of the treaty faithfully.

The preliminary articles of peace between Great Britain on one side and France and Spain on the other were signed on January 20, 1783, and the signing of the definite articles took place at Versailles on the 3d of the following September, at the same time that the definitive Treaty of Paris was concluded between Great Britain and the United States. The preliminary articles of peace between Great Britain and Holland were entered into on the 2d of September. By the terms of the treaty with France, Great Britain restored St. Lucia, Goree, and Pondicherry, ceded Tobago and Senegal, consented to abrogate that article of the Treaty of Utrecht which enjoined the demolition of the harbor and fortress of Dunkirk, and guaranteed fishing rights about Newfoundland and full rights to the islands of St. Pierre and Miquelon. Spain recovered Minorca and Florida, but restored the Bahama Islands, and guaranteed to the English the right to cut logwood about the bay of Honduras. For the treaty ending World War I see **PEACE CONFERENCE OF PARIS**.

Versè, the principal unit by which metrical compositions are measured. Generally speaking, it is equivalent to what we term commonly the line. The elementary unit of metrical compositions is the 'foot'—a little group of one or more syllables measured either by accent or by quantity. The versè in turn consists of a certain number of these feet grouped in definite order, on the conclusion of which the writer turns back and re-

peats the same or a closely related group. As the following verse or verses may vary slightly from the original pattern, so as to form what is strictly termed a stanza, the word verse is sometimes stretched to cover this more elaborate grouping, which is then taken as the principal metrical unit. This application of the term is, however, an inadmissible usage. Further, verse is commonly considered as synonymous with metre in general, and as the antithesis to prose, in which the rhythm of the language is not restricted according to any prearranged pattern. And by a not unnatural confusion of thought, a still further extension of the term makes it equivalent to poetry and the poetical. But verse is only an accidental accompaniment of poetry. Nevertheless it is certainly true that poetry instinctively assumes a metrical form and expresses itself in verse. It aids in the expression of the poetical by establishing a certain definite form of rhythm, and thus apprises the hearer beforehand of the particular musical effect he is to look for. In imaginative prose the strain on the attention is so great that prose cannot long remain at this height without becoming wearisome. In verse, on the other hand, this variety of cadence is restrained within clearly defined limits, and the mind is enabled to concentrate its attention on the subtle changes of harmony within those limits. The grammatical rules of quantity and accent, and the laws of versification, are known as prosody.

Verst, a Russian measure of length, equal to .663 of an English mile.

Vertebrae, or back-boned animals, as first defined by Lamarck, are those in which there is a dorsal axis, consisting of a chain of vertebrae. But the term chordates is preferable, because it is the notochord, not the backbone, which is the supremely important structure; but as vertebrate is a well established term, it is customary to use it as synonymous with 'chordata.'

Vertigo, a sensation of giddiness due to disturbance of the function of equilibration or balancing. The more common causes of the condition are associated with disorders of the eyes and ears. Ocular vertigo is frequently due to a slight squint. Auditory vertigo (synonym, Ménière's disease), or labyrinthine vertigo, is the result of derangement of the semicircular canals of the ear. Vertigo, however, may be due to central nervous disorders, and to derangements of the digestive system. The giddiness associated with seasickness is one of the most distressing fea-

tures of that affection. Severe hemorrhage or any other condition which produces cerebral anemia is likely to cause vertigo, which also follows the use of certain drugs, such as tobacco, alcohol, and quinine. The treatment must depend entirely upon the cause.

Vertue, George (1684-1756), English antiquary and engraver, was born in London. He studied under Vandergucht and later worked under Sir Godfrey Kneller where he achieved fame as an engraver. In 1717 he became engraver to the Society of Antiquaries and in 1730 issued his set of *Twelve Heads of Poets*. After his death his antiquarian notes were bought by Horace Walpole, and were extensively used by him in compiling his *Anecdotes of Painting in England* (1762-71).

Verviers, town, Belgium, in the province of Liège; 14 m. s.e. of Liège. It is noted for woollens, and the dyeing of yarn. In 1914 it was one of the first places entered by German troops; p. 41,717.

Very, Jones (1813-80), American poet and Transcendentalist, was born in Salem, Mass. He was graduated (1836) from Harvard, where he taught Greek for two years. His *Essays and Poems* (1839) marked him as one of the growing group of Transcendentalists. He was licensed to preach by the Cambridge Unitarian Association in 1843, and although he never was placed over a church, he preached occasionally. He was a close friend of Emerson and Channing. The posthumous edition of his *Poems and Essays* (1886) contains an account of his life by James Freeman Clarke.

Vesalius, Andreas (1514-64), Flemish anatomist, was born in Brussels. From 1537 he lectured on anatomy at Bâle, and at Padua and other Italian cities, and in 1544 was appointed physician to Charles v., afterwards to Philip II. of Spain. Accused of having opened the body of a Spanish nobleman before life was extinct, he was forced to take a journey to the Holy Land in expiation of the offense. On his way back to Padua, to occupy the chair of medicine, he was shipwrecked on the island of Zante, where he died of hunger and hardship. His great work is *De Corporis Humani Fabrica*.

Vesey, Denmark (c. 1767-1822), the negro leader of a slave insurrection in South Carolina. He was purchased when about 14 years of age at St. Thomas in the West Indies, and for many years accompanied his master—a sea captain, on his voyages. In 1800 he bought his freedom, and in 1822, having gained great influence among the negroes.

he, together with another negro named Peter Poyas, formed a plot for an uprising of the slaves in and around Charleston against their masters. The attempt failed, and 35 of those engaged in the plot were captured, convicted, and hanged.

Vespasian (9-79 A.D.), whose full name was **Titus Flavius Sabinus Vespasianus**, emperor of ancient Rome 69-79 A.D., was born near Reate in the country of the Sabines. In 43 he commanded the second legion under Aulus Plautius in Britain, and reduced the Isle of Wight (about 47 A.D.). In 51 he became consul, and was proconsul of Africa under Nero, and in 66 governor of Judea. In 69 Vespasian was proclaimed emperor at Alexandria by his own troops. The first notable events of his reign were the suppression of the revolts of the Batavians, the Gauls, and the Jews. The capture of Jerusalem by Vespasian's son Titus, in 70, ended the last rebellion; and after his return to Rome and his joint triumph with his father, the temple of Janus was closed since Vespasian had restored peace to the Roman world. In his reign the conquest of Britain was continued; the dependent kingdom of Commagene was united to the province of Syria; and M. Ulpius Trajanus, father of the emperor, repelled a Parthian invasion of Syria. Vespasian's great task was to restore the finances of the state; he also found money for the new temple of Jupiter on the Capitol, a magnificent temple of Peace, and the vast Flavian amphitheatre commonly known as the Colosseum. But he was forced to increase existing taxes, and to introduce new ones, and so was accused of avarice and parsimony. Personally, he set a noble example of simplicity and economy in his own living.

Vespers (from Lat. *vesper*, 'evening'), or **Evensong**, the next to the last of the canonical hours in the Anglican, Roman Catholic, and Greek Church services.

Vespucci, Amerigo (Latin, **Americus Vespucius**) (1451-1512), Italian navigator, whose name was conferred on America, was born in Florence. After filling responsible positions under the Medici, in 1492 he went to Seville where some years later he took over the business of a Florentine merchant, who outfitted vessels for long voyages. In 1497 he claims to have been a member of the expedition of Vicente Yanez Pinzon which discovered the coast of Central America about the same time that John Cabot discovered the mainland of North America. In 1499-

1500, with Alonso de Ojeda, he skirted the northern coast of South America, in 1503 he discovered All Saints' Bay, Brazil, and in 1508 he was made pilot-major of Spain. He sent to his patrons, the Medici, an account of his voyages but the original manuscript was lost and the translations extant are confused and incoherent. The name America was first suggested for the southern continent only, by Waldseemüller, who translated Vespucci's narrative of his voyages in 1507. For the details of this naming of America consult Thatcher's *Continent of America* (1896), also Fiske's *Discovery of America*.

Vest, George Graham (1830-1904), American public official, was born in Frankfort, Ky. In 1848 he was graduated from Center College, at Danville, and afterwards studied law at Transylvania University. He removed to Missouri, and practiced at Georgetown and then at Booneville, and was a member of the Missouri House of Representatives in 1860-61. He was an ardent sympathizer with the South; was for two years a member of the Confederate House of Representatives; and was then for a year a member of the Confederate Senate. After the war he practiced law at Sedalia and then at Kansas City. During 1879-1903 he was a member of the United States Senate, and was regarded as one of the leaders of the Democratic party.

Vesta, in ancient Roman mythology, the goddess of the hearth, corresponding to the Greek Hestia. As the goddess of the home life her temple stood in the Forum, and contained the sacred fire which Aeneas was believed to have brought from Troy. This fire was watched by the vestals: if by any mishap it was allowed to go out, it could only be relighted by the *pontifex maximus*, through the friction of two pieces of wood. Hers was the last form of heathen worship to give way before Christianity.

Vesta, the fourth and brightest asteroid, discovered by Olbers on March 29, 1807. It revolves in a period of 1,326 days, at a mean distance from the sun of 219 million miles. Vesta alone among the asteroids is visible to the naked eye.

Vestals, or **Vestal Virgins**, entered the service of Vesta between the ages of 6 to 10 and it lasted for 30 years, during which they were bound by a vow of chastity. After the period was over they could renounce their vows, return to the world, and marry. Wills were entrusted to their keeping, and even treaties. A lapse from chastity was punished

by burial alive. Their institution ended in 394 A.D., when Theodosius II. closed the temple.

Vestments and Insignia, Ecclesiastical, the garments and adornment worn during celebration of divine service by the officiating clergy. That a distinctive dress should be developed by the church, differing in detail in the different branches, is in accord with the common instincts of the religious life as shown in ethnic religions. The origin of Christian ecclesiastical vestments was long in doubt, the effort to connect them with the official robes of Judaism continuing until modern times. But recent investigation has shown their derivation from the ordinary dress of Romans, and has traced the subsequent elaboration as the organization of the church developed. In the elaboration which took place, each section of the church acted in accordance with its inherent character. The vestments of the Roman Church became the more numerous, those of the Greek Church fewer but more Oriental in their ornamentation. At the Reformation the Calvinists discarded vestments but developed the Genevan gown. For a time German Lutherans retained the cassock and alb, while the churches of Scandinavia and Denmark continued the use of alb and chasuble. The ornament rubric of the Anglican Church dates from 1662, and continues the use of such vestments as were in use in 1548; but just what those were is not definitely known, and a Royal Commission on Ritual was appointed, which made its first report in 1851. In 1908 a report prepared by five bishops of the Anglican Church concluded that under the ornaments rubric the vestments prescribed in the prayer book of Edward VI. are permitted if not enjoined. In Protestant churches other than the Episcopal there is a tendency to increased use of the Genevan gown in the pulpit.

The separate vestments employed are the following. The amice is a broad piece of linen or silk, with two pieces to fasten it, generally embroidered on the outer edge. It is placed on the head before the alb is assumed, and then allowed to fall on the shoulders, forming a loose collar. In symbolism it represents faith. The alb is a loose garment enveloping the body and reaching to the feet, with close-fitting sleeves. It was developed from the Roman tunic, at first of linen, then of richer materials, and ornamented with appliqued embroidery. Its symbolism is purity and innocence. The episcopal rochet and the more universal surplice are modifications of

the alb. The girdle is a cord or band of silk, usually white and adorned with tassels, used to gather the alb in at the waist. The stole is a scarf or strip of linen or silk three inches in width and eight and a half feet in length, plain or ornamented. It is worn around the neck, but in a different way by each of the orders. At the altar the priest crosses it on the breast, at other times it hangs straight down. The deacon wears it over the left shoulder and fastens it under the right arm. In the Greek Church it is joined at the throat and slipped on over the head, the ends hanging parallel in front. It distinguishes bishops, priests, and deacons from the inferior clergy. The maniple, a narrow strip of linen, three inches in width and two and a half feet long, has developed from the sudarium or napkin, but later became a mere ornament, and is worn over the left arm. The symbolism is strength and endurance. The chasuble is a cloak worn over the alb. It was developed out of the Roman *planeta* or cloak, a loose, circular garment with a hole in the center by which it was passed over the head and allowed to drop upon the shoulders. This was the original shape of the chasuble. It reached nearly to the feet in back and front, and when the hands were employed was gathered up on the arms. The inconvenience of this led to its being cut away on the sides, until its present form leaves the arms entirely free, while it is shortened and shaped to a point back and front. It symbolizes charity. The cope is a long, full cloak, semicircular in shape, often reaching to the feet in the back, open in the front, and is often supplied with a hood. It may replace the chasuble, and is identical in symbolism. The tunicle or dalmatic is a loose coat, falling below the knees, open at the sides near the bottom, has full, short sleeves, and may be profusely ornamented. It is worn by deacons or subdeacons, corresponds in use to the chasuble, but distinguishes the lower orders. The surplice, a loose garment of linen, with loose sleeves, is worn by clerics and assistants (choral or celebrant), and is a substitute for the alb. The cassock is worn under all the other vestments, reaches to the feet, and is in the Roman Church par excellence the clerical garment, black for the priest, purple for the bishop, red for the cardinal. The berretta or biretta is a square cap with three ridges radiating from the center of the top outwards.

For bishops other vestments were developed. The rochet has been mentioned. The pallium is distinctively episcopal, a white

woolen stole or scarf, worn over the chasuble, draped over the shoulders with the ends hanging one before and one behind. It is supposed to represent Peter's mantle, and so the transmission of power. The mitre, first mentioned in 1049 in a charter of Leo IX., has two forms, a lower and a higher. It is a tongue-shaped cap with double points supposed to symbolize the tongues of flame seen at Pentecost. The campagi are sandals or slippers worn by clergy of high rank as early as the 6th century, but only by grant of the popes. The gloves of the bishop are first mentioned by Honorius in the 12th century. The manteletta is an episcopal garment worn over the rochet by bishops out of their jurisdiction, since the uncovered rochet is a symbol of episcopal authority. The episcopal insignia are the ring (early an insignium of equestrian rank), first mentioned in the 7th century as belonging to the bishop; the staff or crozier, resembling a shepherd's crook, but much conventionalized, mentioned as early as 430 A.D., symbolizing authority and leadership; and the pectoral cross, often richly jeweled. The form of the cross borne before dignitaries also indicates rank. An archbishop's pastoral staff does not differ from a bishop's but he sometimes has carried in front of him a staff surmounted by a cross or crucifix—that of a patriarch having two cross bars.

The materials used have tended to become richer and more costly. Originally of linen or woolen goods, vestments have come to be made of the richest silks, satins, velvets, and cloth of silver or gold, varying with the eminence of the office or the wealth and position of the church or individual. Many of the Eastern vestments are adorned not only with costly laces and embroidery but with precious stones. At times much has been made of a color scheme in vestments. Originally the simple white and brown of the Roman dress prevailed, with purple trimmings. But the ecclesiastical colors came to be white, red, blue, green, and black, and in that order in point of frequency, with shades of these in between. A symbolism naturally developed. White was used, at joyous celebrations like Epiphany and Easter, black or red or purple in Passion Week, Great Lent, and at burials and the like. While in the Greek, Roman, and Anglican Churches there is general agreement on the principle underlying the use of colors, the discord is complete if details and occasions are noted. In the Anglican Church, Salisbury, York, Wells, and London furnish four variations, and none of these agrees with either

Roman or Greek usage throughout. Indeed, in the Greek Church vestments are principally white or dark red. Consult Blunt's *Annotated Book of Common Prayer*; Clauss' *Rabat and Chorrock*; Duchesne's *Christian Worship*.

Vestris, Madame (Lucia Elizabeth Bartolozzi) (1797-1856), English actress, was born in London. She married Armand Vestris, a French ballet-dancer, but soon separated from him. She appeared in opera on the Paris stage in 1815, and was at once a favorite. Later (1820) she became famous as an actress in Drury Lane. In 1838 she married Charles James Mathews, and with him visited the United States, returning to London in the beginning of 1839. For a time she managed her own theatre, earning fame as the 'first female lessee the stage has known.'

Vestry, in England the meeting of the inhabitants of a parish for the election of parish officers and the settlement of parish affairs. In a few parishes it is the custom to elect vestrymen to represent the parishioners, thus forming what is called a select vestry. In all rural parishes the non-ecclesiastical powers of the vestry have been transferred to the parish council, or the parish meeting. In the county of London, in which vestries were in many cases the local authority, they have been superseded by the borough councils. In the Protestant Episcopal Church in the United States the vestry is a representative body elected annually by the parishioners to act for the congregation in both spiritual and temporal affairs, combining the functions of trustees and elders or deacons in other American churches. The rector is *ex officio* a member and president.

Vesuvianite, or **Idocrase**, an aluminum calcium silicate common in crystalline limestones, especially when they have been impure and have recrystallized owing to contact with intrusive igneous masses. The crystals are tetragonal, and often show a large number of faces. It has a specific gravity of 3.4. Its hardness (6½), its vitreous or resinous lustre, color (brown to green), and imperfect cleavage, give it a close resemblance to garnet, for which it is often mistaken. Excellent specimens are obtained in Piedmont and at Mount Somma, Italy. Cut and polished, it not unfrequently passes into the hands of purchasers under the name of chrysolite, jacinth, or jargon. A compact, massive variety (*californite*) has been found in California, with a color closely resembling jade.

Vesuvius, a volcano in Italy, s.e. of Naples, about 4,000 ft. high. Almost from the

beginning of the Christian era, because of its small size, accessibility, general state of activity, rich mineralogy, and great diversity of eruptive phenomena it has been subjected to detailed study. On Aug. 24, A.D. 79, it broke into its first recorded eruption (described in a letter of Pliny the Younger to Tacitus), which buried the towns of Herculaneum, Pompeii, and Stabiae. Other eruptions took place in A.D. 203, 472, and 512. In 1611 the mountain was covered by forest, and even the crater was overgrown with shrubs, but these were swept away by the outbreak in 1631. In the 18th and 19th centuries its activity was much greater, so that to date there are over fifty recorded eruptions, a serious one occurring, with great loss of life, in April, 1906. At this time the cone was lowered by several hundred ft., and the shape entirely changed. Observations upon the mountain have been kept from an observatory built at the foot of the crater-cone in 1844, and conducted from 1854 to 1882 by Palmieri, later by Matteucci, and at present by Malladra. Like most lava soils, the sides of the mountain are very fertile, the grapes grown on its slopes producing excellent wine—e.g. *lachrymae Christi* and *vino greco*. Consult Ferret's *The Vesuvius Eruption of 1906*, published by the Carnegie Institute in 1924.

Veszprém, town, Hungary; in the county of Veszprém, 69 m. s.w. of Budapest. Built on a cliff it was for a long time a stronghold of the Turks. It has a castle and an episcopal palace; its Gothic cathedral dates from the 16th century. There are coal mines and iron works; p. 15,534.

Vetch, or **Tare**, a leguminous herb, for the most part climbing, with pinnate foliage, flat pod, and flowers usually blue or violet, although sometimes yellowish or white. There are about 150 species in the northern hemisphere and some in South America. About two dozen species, some of them introduced, occur in North America. The species are cool season plants of easy cultivation. For the most part weedy or insignificant-looking, a few are grown for their bright flowers, and many for green-manure or cover crops. *Vicia sativa*, when sowed with barley, makes good hay, and *V. faba* is a garden bean, cultivated from prehistoric times. The plant thrives best upon calcareous soils, but is also well adapted for clays, as it can be folded by sheep during the dry season of the year. By distributing the sowings a succession may be kept up from May to October.

Vetch, Samuel (1668-1732), first British

governor of Nova Scotia, was born near Edinburgh, Scotland, and educated there and at Utrecht, Holland. He fought for a time under the Prince of Orange, was one of a council of seven in an attempted English governance of Panama; then (1700) took up his residence in Albany, N. Y. In 1705 he attempted to arrange, on behalf of the governor of Massachusetts, a trading treaty between Canada and New England. Three years later he went to England to submit to the Crown a plan for the conquest of Canada. This plan was well received by the Government, and Vetch returned to America to make preparations, but the project was abandoned because the promised fleet did not come. That same year, Vetch called a meeting at Boston, and laid before it a plan for the taking of Port Royal, Nova Scotia. The expedition, under the command of Sir Francis Nicholson, set out in 1710, and was entirely successful. Vetch was appointed first English governor. He remained governor from 1710-12, and was reappointed for another two-year term in 1715. After appealing unsuccessfully to the government of Massachusetts for a bounty in appreciation of his services to the colony, he returned to England, where he died in a debtor's prison.

Veteran Corps of Artillery, a military society, instituted in 1790 by officers of the Revolution and consolidated in 1848 with the Military Society of the War of 1812.

Veterans of Foreign Wars of the United States, founded in 1899, is a patriotic organization, with a membership of 1,500,000. There is a Ladies Auxiliary, founded 1914. V.F.W. headquarters are in Kansas City, Mo. It founded and maintains a National Home for orphans of veterans. It maintains a national dep't. of Americanism, Washington, D. C., with a wide program of community civic service.

Veterinary Medicine, a system of medicine dealing with the nature, prevention, and treatment of animal diseases, the sanitary housing and care of live stock, and similar matters affecting the health of domestic animals and the wholesomeness of their products.

Veto, the prerogative or constitutional right in a chief executive of forbidding or refusing to approve a legislative enactment. The framers of the United States constitution legalized the executive veto for two reasons, both growing out of Hamilton's strong distrust of the common people: a fear of the legislative department encroaching upon the executive; and a hope of preventing hasty and imprudent legislation. A president of the

United States may veto a bill in one of two ways. He may refuse his signature and send the bill back to Congress with his reasons for refusal; or if a bill is presented within the last ten days of a legislative session, he may fail to return it. This last is called the 'pocket veto.' In the State constitutions the governor is usually given a similar limited veto power over all legislation.

Vevey, or **Vivis**, town and resort, Switzerland, in the canton of Vaud, situated on the n. shore of Lake Geneva. It is the center of the Swiss chocolate industry; p. 12,768.

Viborg, town, Denmark, in Jutland; 37 m. n.w. of Aarhus. Features of interest are the cathedral dating from 1130-69; and the Black Friars church (13th century). In heathen times Viborg was the religious center of North Jutland, and the coronation city of the Jutland kings; p. 15,357.

Viborg, town and fortress, Finland, capital of Viborg province, on the Gulf of Finland. It was the scene of disturbances in 1918 after recognition of Finland's independence. March, 1940, it became a part of the Soviet Union; p. 72,200.

Viburnum, a genus of hardy shrubs belonging to the order Caprifoliaceae, with about 120 species, some evergreen, but mostly deciduous. Many species are cultivated. *V. opulus* is the well known common snowball.

Vicar, properly one who performs the duties of another, a substitute. The chief usage of the word is ecclesiastical. In England, when the tithes of a parish belong to a layman, or a spiritual corporation, such as the dean and chapter of a cathedral, the incumbent of the parish church is generally a vicar, and his house a vicarage.

Viceroy, a title applied to an officer representing the supreme authority in a dependency, as the governor-general of India (since 1858).

Vichy (Lat. *Aquae Calidae*), town and watering place, France. It has been known since Roman times for its mineral springs. Bottled Vichy water is largely exported; p. 19,507. It became French capital, 1940.

Vicksburg, the principal city of Mississippi. Vicksburg is one of the richest cotton-producing sections of the United States, and the timber resources of the vicinity are also great. The National Cemetery is a beautiful spot which contains the graves of more than 16,000 soldiers of the Civil War. Vicksburg was settled in the 18th century and was incorporated as a city in 1816. It is a port of entry. The city was a Confederate stronghold

during the Civil War, and is famous for the long siege it underwent before surrendering to General Grant on July 4, 1863; p. 27,948.

Vicksburg, Campaign of, the longest individual siege in the United States Civil War. It marked the turning point of the war and was the primary cause of Grant's elevation to the position of Commander-in-Chief of the Union armies and his resulting pre-eminence in the public eye. Early in 1863, Grant, since it was within his territory, assumed 'the immediate command of the expedition against Vicksburg.' He proceeded toward it in face of bitter discontent in the North, and a weakened morale in his army due to epidemics of malaria, measles, and smallpox. Moving with amazing celerity, his entire army on rations of hard bread, coffee, and salt, Grant cut loose from his base, Grand Gulf, and moved upon Vicksburg. Near what is called Champion's Hill, portions of the two forces met and a severe battle was fought.

Vicksburg was in a pitiable state; it was filled with the ragged and demoralized army, and its food supplies were perilously low. On the 19th of May Grant ordered a general assault. His assault was renewed but failed. It was at this time that Grant made his famous remark, 'I intend to continue along this line if it takes all summer.' After this, began the regular siege; on the 4th of July the surrender was completed. As a result of the campaign the Confederate dead and wounded numbered about 10,000 and Grant lost about 9,400 men. Consult Rhodes' *History of the United States*; Harper's *Encyclopedia of United States History*.

Vico, Giambattista (1668-1744), Italian philosophical and historical writer, was born in Naples. In 1697 he became professor of rhetoric in the University of Naples, and in 1734 historiographer to Charles III., King of Naples. All his books lead up to the *Principi della Scienza Nuova d'Intorno alla Comune Natura delle Nazioni* (1725). By this work Vico became the founder of the philosophy of history.

Victor Emmanuel I. (1759-1824), king of Sardinia (1802-1821), the second son of Victor Amadeus III. was born in Turin. The first Peace of Paris (1814) restored Piedmont, Savoy, and Nice to him; the second (1815) gave him Genoa. In 1821, he abdicated in favor of his brother, Charles Albert.

Victor Emmanuel II (1820-78), king of Sardinia from 1849 to 1861, and king of Italy

Imperial Palace, the home of the Hapsburgs from 1278 until the fall of the empire (1918); and the Augustiner-Kirche, built in the fourteenth century; and the old Rathaus; while in the eastern part are the Reichs-Finanz-Ministerium and the Academy of Science. On the Ringstrasse are the Exchange; the University, a great quadrangular structure in the Italian Renaissance style; the imposing modern Rathaus, built in 1872-82; the Czernin Palace; the magnificent Opera



Queen Victoria, in 1838, shortly after her accession to the throne.

House lavishly adorned with statuary and paintings; the Art Museum, and the Musikverein, housing the Vienna Conservatory of Music. Vienna is an important manufacturing city, producing iron and steel articles, gold, silver, tin, and bronze wares, cotton, silk, and wool materials, leather, pottery, furniture, chemicals, and beer. It is a large grain and cattle market and a flourishing commercial center; p. 1,760,789.

Vienna, Congress of, a conference of all the European powers, except Turkey, which met in Vienna from September, 1814, to June, 1815, for the purpose of settling the political map of Europe after the fall of

Napoleon. The main results of the negotiations were as follows:

The bulk of the Duchy of Warsaw was awarded to Russia as the Kingdom of Poland. Cracow was made a neutral republic. Prussia received West Prussia, Posen, the northern half of Saxony, and the bulk of the provinces of the Rhine and Westphalia. Hanover was enlarged and made into a kingdom. Bavaria was compensated for her losses to Austria and Prussia. A territorial commission for the settlement of boundary disputes between the German states was established at Frankfurt, where it sat until 1819; and Germany was reorganized as a confederation of 39 states, including all German territory in Austria, Prussia, Denmark, and the Netherlands. Austria received back most of the territories lost by her in the wars with France, and was compensated in Germany, Italy, and Illyria for the loss of Belgium. The Hapsburg princes were reinstated in Tuscany and Modena, as were also the Bourbon king of Naples, the pope, who lost Avignon and Venaissin to France, and the King of Sardinia, to whose possessions Genoa was added. Parma was given to Maria Louisa, the wife of Napoleon, and Lucca to a Spanish Bourbon. France lost additional towns and districts to Prussia, Bavaria, the Netherlands, and Sardinia as a result of Waterloo. Belgium, Holland, and Luxemburg were united to form the Kingdom of the Netherlands. Norway and Sweden were united, and Denmark received Swedish Pomerania, which she ceded to Prussia in exchange for Lauenburg. Neuchatel was added to Switzerland. Finally, England retained Cape Colony and Ceylon, Mauritius, Helgoland, and Malta, and assumed a protectorate over the Ionian Islands.

Vienna, University of. One of the oldest universities in Europe, founded in 1365. In 1623 Ferdinand II. put the Jesuits in control. Joseph II. made it a state institution and deprived it of academic freedom, which was regained during 1848-50. A new university building was dedicated in 1884. The university has faculties of theology, law and political science, medicine and philosophy. In 1905 it had 6,926 students. Its library contains nearly 700,000 volumes.

Vienne, dep. of W. France, between Indre on e. and Deux-Sèvres on w.; covers an area of 2,711 sq. m., and is watered by the Vienne. Wheat, oats, and vines are cultivated, and cutlery, arms, and paper are manufactured. The capital is Poitiers; p. 310,474.

Vienne, town, dep. Isère, France, on left bk. of Rhone, 18 m. s. of Lyons; has manufactures of woolen caps and gloves, and lead and copper mining. Its cathedral is Romanesque Gothic. It was the chief city of the Allobroges, later of the kingdom of Burgundy (450-534 and 879 onwards). Under the Roman empire it rivalled Lugdunum (Lyons) in importance. Several remains of the ancient city still survive; p. 25,092.

Vienne, Haute. See **Haute-Vienne**.

Vieques, Isla de, or Crab Island, 7 m. e. of Puerto Rico, and under its administration, together with the neighboring island of Culebra. It is 19 m. long and 3 m. broad, is very fertile, has a good climate, and has several deep water harbors. Sugar and cattle are

s.w. of Krefeld; has manufactures of textiles; p. 24,761.

Vierzon, tn., dep. Cher, France, on the Cher, 20 m. by rail n.w. of Bourges; has manufactures of glass and porcelain; p. 11,569.

Vieta, Franciscus, or François Viète (1540-1603), French mathematician, was born at Fontenay-le-Comte. He was a lawyer at Poitiers until 1567; then councillor of the parlement of Brittany and that of Tours (1589), and privy councillor to Henry iv. His *Opera Mathematica* were published at Leyden (1646).

Vieuxtemps, Henri (1820-81), Belgian violinist and musical composer, born at Verviers. He was a great exponent of the mod-



Parliament Building, Vienna.

the leading products. The principal ports are Isabel Segunda and Punta Arenas; p. 10,582.

Vierge, Daniel Urrabieta (1848-1904), Spanish artist, born at Madrid; went to Paris (1870), where he was employed as draughtsman on *Le Monde Illustré*, *La Vie Moderne*, and *L'Image*. He illustrated Hugo's *L'Année Terrible* (1874), *Les Travailleurs de la Mer* (1876), *L'Homme qui Rit* and *Quatrevingt-treize* (1877), *Les Misérables* and *Notre Dame de Paris* (1882); Michelet's *Histoire de France* (1876-8), and *Histoire de la Révolution* (1883-7); Quevedo's *Don Pablo de Segovia* (1882); Bergerat's *L'Espagnole* (1891), *La Nonne Alfarez* (1894), and *Le Cabaret des Trois Vertus* (1895). He was a brilliant master of black-and-white. See Jacacci's *Daniel Vierge, The Master Illustrator* (with reproductions of some of his illustrations for *La Vie Moderne* and *Le Monde Illustré*), in *McClure's Magazine* (March, 1897); Marthold's *Daniel Vierge* (1905).

Viersen, tn., Rhine prov., Prussia, 10 m.

ern brilliant school of violin-playing, and many of his compositions take high place in classic violin music. He made successful tours of the U. S.

Vigan, pueb., Philippines, cap. of Ilocos Sur prov., Luzón, on an island formed by the delta of the Abra R., and on the Dagupan and Manila R. R. It has some fine buildings, among them the cathedral, bishop's palace, court house, administration building, council seminary, and a monument to Juan de Salcedo, the conqueror of the province. Vigan has fisheries, brick kilns, cotton manufactures, and boat-building yards; p. 19,939.

Vigevano, tn., Pavia prov., Lombardy, Italy, on the Ticino, 19 m. s.w. of Milan; has silk-spinning and manufactures of boots and furniture; p. 23,560.

Vigfusson, Gúðbrandr (1828-89), Icelandic scholar, born in Breidafjörð; became stipendiary in the Armagnac library at Copenhagen. Settling in Oxford (1866), he was appointed Icelandic reader (1884). His

writings opened a new era in the scholarship of his country; they include *Timatal* (1855) *Biskopa Sögur* (1856-78); *Bardar Saga* (1860); and *Fornsögur*, with Möbius (1860); *Eyrbyggja Saga* (1864); *Flateyjarbok*, with Unger (1860-8). He completed the *Icelandic-English Dictionary* (1859-74), commenced by Cleasby; while *Sturlunga Saga* appeared in 1878, and *Corpus Poeticum Boreale* (with Powell) in 1883.

Vigil, the evening before certain holy days—e.g. the Nativity. St. Jerome defends the custom of all-night vigils (*Ep.* xxxvi.); but about the year 420 evening fasts were substituted as more conducive to public order. A night-long fast on All-hallows-day seems to have continued in England till 1545.

Vigilance Committee, an association of private persons for the purpose of putting down crime and disorder through the infliction of summary penalties. Such associations have existed in the United States from the middle of the 18th century, if not from an earlier date. In the 18th and the early 19th century they were generally known as 'regulators.' In the first decade before the Civil War, the term vigilance committee came into general use; in recent years similar organizations have often assumed the name of 'citizens' association.' In a limited section of the Southern states such associations take the name of 'White Caps,' and the Ku-Klux-Klan is a society of this type.

Vigilance committees have flourished especially in frontier communities. In some cases the committees have endeavored to follow closely the procedure of the regular courts. The penalties inflicted could, of course, be only such as permitted of immediate execution: whipping and banishment for minor offences; death for major ones. In most cases, however, the 'vigilantes' have proceeded in a more violent manner, often inflicting the most extreme penalties upon persons merely suspected of crime. As a rule, such associations show a tendency to degeneration. While at first the committee may consist of the best citizens, who proceed to action only upon the greatest provocation, in the end it is liable to become an association of common criminals, who commit the most serious outrages, until at last they are suppressed either by the regularly constituted authorities, or by a counter-association.

The highest development of the vigilance committee in the United States took place in the Far West, during the rapid growth of mining communities. After the discovery of

gold in California, large numbers of outlaws and desperadoes from all over the world flocked into the district, and the administration of justice was largely in the hands of vigilance committees. In 1851, and again in 1856, vigilance committees were formed in San Francisco. These hanged a few of the worst criminals, and banished a considerable number. With the restoration of public order the vigilance committees promptly disbanded. Similar committees were subsequently formed in Utah, Nevada, Arizona, New Mexico, Montana, Idaho, Colorado, Oregon, and Washington. In most cases these committees, although severe in the penalties they inflicted, served a useful purpose in maintaining order. See RECONSTRUCTION; KU KLUX KLAN; NEGRO PROBLEM. Consult H. H. Bancroft's *Popular Tribunals* (1887), and J. E. Cutler's *Lynch Law* (1905).

Vigilantius, a presbyter of the 4th century, a native of Gaul, who put himself in opposition to the excessive cult of saints, the use of relics, and the ultra-ascetic tendency of the monks. See Gilly's *Vigilantius and his Times* (1844).

Vignaud (Jean) Henry (1830-1923), American author, born in New Orleans of Creole parentage. He taught school, engaged in journalism, served as a captain in the 6th Louisiana regiment and was captured at New Orleans, and in 1863, after being exchanged, became secretary of the Confederate diplomatic commission in Paris. In 1869 he was appointed secretary of the Roumanian legation in the same city, was connected with the Alabama Claims Commission in 1872, and in 1873 was U. S. delegate to the International Metric Conference. Two years afterwards he became second secretary to the American legation of Paris, and in 1882 became first secretary. Among his publications are *L'Anthropologie* (1861); *Toscanelli and Columbus* (1902); and *Critical and Bibliographical Notices on All Voyages which Preceded and Prepared the Discovery of the Route to India by Diaz and to America by Columbus*.

Vignette, a photograph or drawing in which the background is gradually shaded away to the margin. The word originally meant the Gothic ornament of vine leaves and grapes used in architecture.

Vignola, whose real name was **Giacomo Barozzi or Barocchi** (1507-73), Italian architect, born at Vignola, near Modena; was papal architect (1550), and architect of St. Peter's, Rome (1564). He designed the church of St. Petronius at Bologna, and some

of the finest buildings in that city. As architect to Pope Julius III. he built for him the Villa Giulia. He also designed the palace of Cardinal Alexander Farnese at Caparola, near Viterbo. He wrote a long famous *Regole delle Cinque Ordini d'Architettura* (1563; new ed. 1815).

Vigny, Alfred Victor, Count de (1799-1863), French poet, born at Loches (Indre-et-Loire). In 1822 were published his *Poèmes*, followed (1824) by *Eloa*, and (1826) *Poèmes Antiques et Modernes*. His novel of *Cinq Mars* (1826), which shows the influence of Sir Walter Scott, is the first historical romance of French literature. Then followed the drama *La Maréchale d'Ancre* (1831). *Stello* (1832) is a prose work celebrating the luckless poets André, Chénier, Gilbert, and Chatterton. Next, in 1835, appeared *Servitude et Grandeur Militaires*. The same year he achieved his greatest triumph in his drama of *Chatterton*. In 1842 he was received into the Academy. In 1864 appeared *Les Destinées*, containing verse of rare beauty; and (1867) *Journal d'un Poète*, of uncommon range and delicacy of sensibility. His *Œuvres Complètes* appeared in 8 vols. (1883-85). See notices by M. Paléologue (1891), E. Montégut (1867), and Sainte-Beuve.

Vigo, city, prov. Pontevedra, Spain, naval station on Atlantic, and one of the best harbors in Spain; has considerable fishing and preserving industry; p. 61,060.

Vijayanagar, ruined city, Bellary dist., Madras Presidency, India; was from the 14th to the 16th century capital of a powerful Hindu kingdom. See *A Forgotten Empire* (Vijayanagar), by R. Sewell (1900).

Viking. See *Norsemen*.

Vilas, William Freeman (1840-1908), American lawyer and political leader, born at Chelsea, Vt. His family removed to Wis. when he was eleven, and in 1858 he graduated at the University of Wisconsin. In 1860 he graduated at the Albany (N. Y.) Law School, and in the same year began the practice of law at Madison, Wis. In 1862 he raised a company for service in the Federal army, and with the rank of lieutenant-colonel of volunteers commanded a regiment during part of the Vicksburg campaign. In 1875-78 he was a member of a commission of three appointed by the Wis. Supreme Court to revise the statutes of the state, and in 1881-85 he was professor of law in the University of Wisconsin. In politics a Democrat, he gradually became one of the leaders of his party in Wis. He was a member of the

lower house of the state legislature in 1885, and was a member of President Cleveland's first cabinet, first as postmaster-general (1885-88) and afterwards as secretary of the interior (Jan., 1888-March, 1889).

Villa, Francisco (Pancho) (1877-1923), Mexican bandit. With Zapata he seized Mexico City, but surrendered to Obregon. In 1916 was pursued by Gen. Pershing for raids in U. S. Was later assassinated by his own followers.

Vilayet, the name given to a Turkish province. A *sanjak* is a subdivision of a vilayet.

Villafranca, tn., Verona prov., Venetia, Italy, 10 m. s.w. of Verona; has manufactures of silk; p. 12,174. Here, in 1859, peace was concluded between France and Austria.

Village Community. Seeböhm believes that in eastern England the agricultural village community existed—and in western England the tribal system—in a pastoral stage, with a periodic redistribution of lands, which has no place in the village community so far as regards arable land. The questions naturally arise—Is the village community a primitive institution? Was it composed of freemen or of serfs? And if of freemen, when was the manorial system imposed on it? And, above all, what was the relation of the village community to the tribal system which existed side by side with it as in Britain? To these questions Vinogradoff returns answers which represent the safe middle ground. 'The communal organization of the peasantry he finds more ancient than the manorial order'—that is, it may have been an institution of free men, though probability points to a mixture of free and unfree elements. But it is hardly a primitive institution, because by its division of arable land into strips it shows traces of that periodical redistribution of the land which characterizes the tribal system. The village community is, therefore, what the tribal system became when agriculture was introduced. Hence the village communities were the tribe divided into agricultural groups, with an overlord, generally at a distance, to whom tribute was paid. At first the relation between the village and the overlord was remote, but the feudal system introduced intermediate lords, who looked not so much for tribute as for the cultivation of the land; and thus the distant lord was replaced by a neighboring lord of the manor, and that the freedom of the village community was changed to the practical servitudes of the manor. This change may have come with the

advent of the Romans, but feudalism made the pressure closer. See Seeböhm's *English Village Communities* (1884), Gomme's *Village Community* (1890), Baden-Powell's *The Indian Village Community* (1895).

Villani, Giovanni (c. 1275-1348), Florentine historian, was prior of Florence in 1316, 1321, and 1328. His chronicle becomes of the utmost value as it approaches the author's own period. Scarcely less important is the continuation of the work by his brother Matteo, who brought it down to 1363. Finally Matteo's son Filippo not only completed his father's eleventh book, but himself undertook a useful *Liber de Civitatis Florentinae Famosis Civibus* (ed. by Galletti, 1847). The earliest edition of the entire chronicle (1537) was followed by those of Magheri (1823-6; with Mazzuchelli's *Vite*), Gherardi-Drögmanni (1844), and Racheli (1857-88). See, too, Selfe and Wicksteed's *Selections from the first nine Books of the Cronache Florentine* (1896).

Villard, Henry (1835-1900), American journalist and financier, born in Speyer, Rhenish Bavaria. His family name was Hilgard, which he changed to Villard when he came to the U. S. in 1853. He was a newspaper correspondent during the Civil War, and in 1866 reported the Austro-Prussian War for the *New York Tribune*. In 1873 he represented the German bondholders whose American investments had been endangered by the panic of that year, and formed a syndicate which obtained control of the Northern Pacific Railroad, of which he became president in 1881. He completed the road to the Pacific, but lost his personal fortune in the financial collapse that followed. With the aid of German capital he afterwards obtained control of the road again, and was for several years its leading spirit. In 1881 he bought the *New York Evening Post*, turning its editorial control over to his friends, Carl Schurz, Horace White, and E. L. Godkin. In 1890 he organized the Edison General Electric Company, of which he became president. He left a large bequest to Harvard University. He wrote *Memoirs*, which were published in 1904.

Villard, Oswald Garrison (1872-1949), son of Henry Villard and grandson of William Lloyd Garrison, was editorial writer and president of the *New York Evening Post* (1897-1918), and was owner and editor of *The Nation* since 1918. His published works include *John Brown* (1910), *Germany Embattled* (1915), *Newspapers and News-*

papermen (1923), *Fighting Years* (1939); *Free Trade—Free World* (1947).

Villari, Pasquale (1827-1917), Italian historian and statesman, born at Naples. Exiled for political reasons in 1847, he sought refuge at Florence, where (save for three years as professor of modern history at Pisa, 1859-62) he remained until his death. In 1862 he was appointed to the chair of history at the Florentine *Istituto di Studi superiori*. At various times he was deputy, senator, and minister of instruction (1891). He was president of the Accademia de' Lincei. His books on *Savonarola* (1859-61; Eng. trans. by his wife, Linda Villari, an Englishwoman, 1888), *Machiavelli* (1877-82; Eng. trans. 1878), the *Barbarian Invasions of Italy* (Eng. trans. 1902), and *The Two First Centuries of Florentine History* (1893-4; Eng. trans. 1894-5) have revolutionized history-writing in Italy. His *Scritti sulla Questione sociale in Italia* appeared in 1902.

Villa Rica, town, Paraguay, 75 m. e.s.e. of Asunción. It is the largest town of the interior, is surrounded by timber lands, and has a flourishing trade in tobacco and maté, or Paraguay tea. Coffee and fruits are also grown; p. 13,000.

Villars, Claude Louis Hector, Duke de (1653-1734), marshal of France, was born at Moulins. A cavalry officer under Turenne, Condé, and Luxembourg, he commanded (1692) in the action of Pforzheim. During the peace of 1698-1701, Villars was entrusted with a secret diplomatic mission at Vienna; for he shone in society and cabinet as he did on the field. Appointed to the chief command in 1702, he led an army to the support of the elector of Bavaria, and winning the battle of Friedlingen, was made marshal of France. Joining the elector of Bavaria in 1703, his design of marching on Vienna was frustrated by that prince's indolence. In spite, therefore, of his victory of Höchstädt, he sought his recall. Dispatched to the Cevennes (1704), he humanely concluded peace with the insurgent Camisards. In 1709 he was defeated by Marlborough at Malplaquet. Commander-in-chief in the Netherlands, he gained a victory at Denain in 1712, and brought about the peace of Rastatt (1714). Villars, in 1733, drove the imperialists from Milan and Mantua. He died at Turin. His *Mémoires* were published by De Vogüé (1884-7). See also *Vies* by De Vogüé (1888) and Giraud (1881).

Villasia, pub., Pangasinan prov., Luzón, Philippines, 24 m. s.e. of Lingayén, on the

Agno R., and at the junction of several important highways; p. (1903) 12,660.

Villegas, Esteban Manuel (1596-1669), Spanish poet, born at Najera in Castile. As a boy he produced a series of Anacreontic erotic verses, which have had no equal in the language, and upon their publication, under the title of *Las Eróticas* (1617-18), took the town by storm. In 1620 an enlarged collection called *Amatorias* was issued. See Ticknor's *History of Spanish Literature* (1849).

Villehardouin, Geoffroi de (c. 1160-c. 1213), French historian, was born at the castle of Villehardouin in Aube. Marshal of Champagne (1191), he went in 1201 to negotiate with the Venetians about the transport of the crusaders to the Holy Land. He took part in the expedition ending in the storming of Constantinople and the fall of the Greek empire. He rescued the crusading army at Adrianople from complete destruction by the Bulgarians. His *Conquest of Constantinople* is of great value, and narrates the events of the fourth crusade, from 1197 to 1207. See the edition by De Wailly (1882), and Sainte-Beuve's *Causeries du Lundi*, ix.

Villein, in feudal times, one who tenanted land by *villein*—i.e. by performing base or menial service to his superior.

Villemain, Abel François (1790-1870), French author and politician, was born in Paris, and when barely twenty was appointed to the chair of rhetoric in the Lyceum of Charlemagne. After the second restoration he became professor of eloquence to the faculty of letters. About the same time he entered the ministry as chief of the department of printing and publishing, and was afterwards named *maître des requêtes* to the Council of State. He became a member of the Chamber of Deputies (1830); was made a peer of France, and vice-president of the Royal Council of Public Instruction (1832), and minister of public instruction (1839-44). His chief works were *Histoire de Cromwell* (1819); *Lascaris, ou les Grecs du XV. Siècle* (1825); *Cours de Littérature française* (1828-30); and *Histoire de Grégoire VII.* (1873).

Villena, town, Alicante prov., Spain, 28 m. n.w. of Alicante; has manufactures of soap, brandy, silk, and salt; p. (1900) 14,099.

Villena, Enrique de (1384-1434), Aragonese writer, looked upon by his contemporaries as a prodigy of learning. He wrote an art of poetry (*Arte de Trovar*), and was

a principal promoter of the affected poetical contests then in favor with the Spanish courts. He translated the *Aeneid*, and much of Dante; and there survives a curious work of his on the art of carving and serving food, and a dissertation on the evil eye. The church burnt most of his books after his death. See Cotarelo y Mori's *Don Enrique de Villena* (1896).

Villeneuve, Pierre Charles Jean Baptiste Sylvestre de (1763-1806), admiral of France, was born at Valensoles (Basses-Alpes). He was in command of the rear division of the French fleet at the battle of the Nile. He was then appointed to command the Toulon fleet, and engaged Sir Robert Calder off the Azores. Blockaded in the harbor of Cadiz by Nelson, he ventured out, and lost all at the battle of Trafalgar (1805).

Villeneuve-sur-Lot, town, dep. Lot-et-Garonne, France, 15 m. n.n.e. of Agen; has manufactures of paper and linen; p. (1901) 12,885.

Villeroi, François de Neuville, Duke de (1644-1730), marshal of France, was brought up at the court of Louis xiv. He was made a marshal in 1680, but showed incapacity both in the Netherlands and in Italy, where Prince Eugene took him prisoner at Cremona. Marlborough defeated him at Ramillies (1706). Through Madame de Maintenon's influence he was made guardian of Louis xv.

Villiers, Charles Pelham (1802-98), English statesman and reformer, born in London, and called to the bar at Lincoln's Inn (1827). He was returned mp. for Wolverhampton (1835), and retained the seat until his death. He was president of the Poor Law Board, with the cabinet rank (1859-66). Throughout the U. S. Civil War Villiers advocated the cause of the North.

Villiers, Frederic (1852-1922), English war correspondent and artist, born in London. He was in Servia (1876); with the Russian army in Turkey (1877); in Afghanistan (1878); at Tell-el-Kebir (1882); in the 'broken square' at Tamai (1882); with the Nile expedition (1884), and at the battles of Abu-Klea and Gubat (1885). He lectured in the U. S. and Canada after 1887, and during the Chinese-Japanese war of 1894-95 he was special artist for *Black and White*, the *New York Herald*, and other papers. He was attached to the Australian contingent during the S. African war (1899-1902), and was at Port Arthur during the Russo-Japanese war (1904-5).

Villiers de l'Isle-Adam, Philippe Auguste Mathias, Count (1840-89), French poet, prominent in the Symbolist movement, was born at Saint-Brieuc in Brittany. He wrote a large number of dramas and poems among them *Isis* (1862); *La Révolte* (1870); *Le Nouveau Monde* (1883); *Une Evasion* (1887); *Axel*; *Elen* (1862), and *Morgane* (1862); *Contes Cruels* (1883); *Tribulat Bonhommet* (1887); *Aktdysstril* (1888); and two philosophical romances, *L'Amour Suprême* and *L'Eve Future* (1886). See *Life*, in French, by Pontavise de Heussy (Eng. trans. 1894).

Villisca, city, Montgomery co., Ia., 13 m. n. of Clarinda, on the Nodaway R., and on the Chi., Burl. and Quin. R. R. It has a cultivator manufactory, concrete bridge works, and brick, tile, flour, and cooperage manufactures. Villisca was settled in 1847, incorporated in 1853, and chartered in 1897; p. (1910) 2,011.

Villon, François (1431-c. 1485), French poet, whose original name was Corbueil or De Montcorbier, was born in Paris. In 1455 he was banished for killing a priest in a street brawl, but in 1456 received a pardon, and on his return to Paris wrote his celebrated poem *Le Petit Testament*. In 1457, for some offence, he was sentenced to death, after submitting to the 'ordeal by water'; but having obtained a respite, he was again banished. In 1461 he was in prison at Meung-sur-Loire. This time he owed his escape to a jail delivery on the accession of Louis XI., when he wrote his greatest work, *Le Grand Testament*. Rabelais brings him to the court of Edward IV., and makes him, in his old age, retire to St. Maixent in Poitou. His poetry marked an era in the literature of Europe, displaying a strong capacity of feeling and expression, and a singularly mournful tone. Among his other poems are the *Ballade des Dames du Temps Jadis* and *Le Jargon*. *Les Repues Franches*, exquisitely translated by D. G. Rossetti, is wrongly attributed to Villon. The first dated edition of his poems is of 1489; good modern editions are by Bibliophile Jacob (1854) and W. von Wurzbach (1903); and English translations have been made by Payne (1878), Swinburne, Lang, and Henley. Villon figures in the play of *The Balladmonger*, and in J. H. McCarthy's *If I Were King*, which has been frequently produced in the U. S. with E. H. Sothern in the title rôle. See Profilet's *De la Vie et des Ouvrages de Villon* (1856); Campaux's *Villon, sa Vie et ses Œuvres* (1859); Longnon's

Etude Biographique sur François Villon (1877); and Bijvanck's *Specimen d'un Essai Critique sur les Œuvres de François Villon* (1882).

Vilna, (1) city, capital of the Lithuanian Soviet Socialist Republic, (2) province, Lithuanian S.S.R. Area 26,421 sq. m. Pop. about 1,000,000. The surface is mostly a sandy plain; the highest point, w. of Vilna city, reaches 1,020 ft. The government belongs to the Niemen and W. Dwina basins. Lakes and marshes are numerous. Black earth is found in the w., n.w., and n.e. Orchards and nurseries flourish. Domestic industries are mainly concerned with timber. The greater industrial establishments include flour, saw, and paper mills, distilleries, breweries, tanneries, glass and brick works. Of the population over one-half are Roman Catholics (Lithuanians and Poles), and nearly one-fourth Orthodox (White and Great Russians).

Vilna, city, 436 m. s.w. of Leningrad. It is the seat of an Orthodox archbishop and of a Roman Catholic bishop, and has three cathedrals, St. Nicholas (Greek Catholic), St. Stanislas (Roman Catholic), the Holy Virgin (Greek Orthodox). Other features of interest are the churches of St. John (1388), of St. Anne (c. 1390), of St. Mary (14th century), of the Holy Spirit (1441), of SS. Bernard and Francis (1469), of St. Theresa (1626), convents of the Trinity (c. 1490) and of the Holy Spirit (1592); a gate of the sixteenth century, with a famous image of the Virgin; the governor's palace, formerly the residence of Roman Catholic archbishops (16th to 18th century); buildings of a university founded by Stephen Bathori in 1578, suppressed in 1832, but still containing two high schools. Vilna is a river port and manufacturing city. During World War I, Vilna was occupied by the Germans (Sept. 18, 1915). After the war the possession of the city was a matter of dispute between Lithuania and Poland; it was occupied by Polish troops in 1920, and the Polish occupation was legalized in 1923. Vilna was in that part of Poland which went to Russia in the 1939 partition. Later Russia ceded the city to Lithuania. Vilna (Vilnius) is capital of the Lithuanian S.S.R.; p. ab. 182,000.

Vimy Ridge, a ridge of hills in Pas de Calais, France, 5 m. n.e. of Arras. It was the scene of important action in the Great War, being brilliantly stormed by Canadian troops. Near the crest of the ridge are two monuments to Canadian heroism. Sir

Julian Byng, in command of the Canadian Corps, made the name a part of his title—First Baron Byng of Vimy. See ARRAS, BATTLES OF.

Vincennes, fortified town, France, in the department of the Seine, 2 m. e. of the fortifications of Paris, on the north border of the Bois de Vincennes. It has manufactures of chemicals and cartridges. The keep of its castle was the prison of Henry IV., the Great Condé, Diderot, Mirabeau, and others. Many notorious spies, including Mata Hari, were executed here during World War I; p. 45, 236.

Vincennes, city, Indiana, county seat of Knox co., on the Wabash River, and on the Baltimore and Ohio, the Chicago and Eastern Illinois, the Cleveland, Cincinnati, Chicago and St. Louis, and the Pennsylvania Railroads; 56 m. s.w. of Terre Haute. Three transcontinental highways pass through the city—the Midland Trail from the Atlantic to the Pacific; the Dixie Bee Line from the Great Lakes to Florida; the Magnolia Highway from the Great Lakes to the Gulf. The principal buildings and institutions are Vincennes University, the Federal Building, city hall, court-house, the Catholic cathedral to which is attached a library of great interest, Vincennes Sanatorium, St. Vincent's Orphanage, St. Rose Female Academy (R.C.), and a public library. Points of historic interest are the house of William Henry Harrison, occupied by him during his term as territorial governor, the old legislative hall, Harrison Park, the sites of Fort Sackville and Fort Knox, and the Indian mounds in the vicinity.

The manufactures include flour, lumber, staves, glass, furniture, phonographs, paper, bridges, sewer pipes, rolled iron stoves, tools, oil refining, corrugated paper boxes, novelties, and pearl buttons. There are pearl fisheries in the Wabash. Coal-mining is carried on in the vicinity and there are also gas and oil wells. The vicinity also provides grain, pork and cattle. The town was established as a French trading post in 1702. In 1779 it was captured for Virginia by Col. G. R. Clark, in whose honor a statue was erected in 1906. The region was ceded to the United States by Virginia in 1784, and Vincennes was the capital of Indiana Territory from 1800 to 1816; p. 18, 228.

Vincennes, Jean Baptiste Bissot, Sieur de (1688-1736), Canadian explorer, was born in Quebec, a relative of Louis Joliet. At the age of thirteen he entered the Cana-

dian Army as a cadet, and three years later was dispatched to the Miami country where he remained several years, learning the language and customs of the Miami. He resided subsequently in Ohio and Michigan, afterward (1725) establishing a fort and trading post at what is now Vincennes, Ind. In 1736 he joined the punitive expedition against the Chickasaw Indians, under D'Artaguette. As a result of the desertion of their Miami allies at the critical moment, the invading force was utterly routed, and Vincennes and its leader were taken prisoners and burned at the stake.

Vincent, Saint (d. 304), was born in Saragossa. He was involved in the persecution of Diocletian (303), and according to tradition, by his heroism under his sufferings converted his jailer to Christianity. His day is January 22. He died at Valencia, in Spain.

Vincent, Boyd (1845-1935), American Protestant-Episcopal prelate, was born in Erie, Pa. He was graduated from Yale (1867) and from the Berkeley Divinity School (1871), was ordained deacon in 1871 and priest in 1872. He was assistant at St. Paul's Church, Erie, during 1871-2, was rector of the Cross and Crown Church in the same city in 1872-4, and rector of Calvary Church, Pittsburgh, in 1874-89. In the latter year he was consecrated Coadjutor Bishop of the diocese of Southern Ohio, becoming Bishop in 1904.

Vincent, Sir Charles Edward Howard (1849-1908), English author and soldier, was born in Slinford in Sussex. He was director of the criminal investigation department of the metropolitan police force until 1884, and was M.P. for Central Sheffield (Conservative) from 1885 until his death. He served during the Boer War with the Queens Westminster Volunteers. He published *Russia's Advance Eastward* (1874); *Police Code and Manual of Criminal Law* (1882; 12th ed. 1903); *Military Geography, Reconnoitring, and Sketching* (1873); *Law of Criticism and Libel* (1876); *Law of Extradition* (1881).

Vincent, Frank (1848-1916), American traveller and author, was born in Brooklyn, N. Y., and studied at Yale. His valuable collection of Indo-Chinese antiquities and art and industrial objects was presented to the New York Metropolitan Museum of Art in 1884. His books include *The Land of the White Elephant* (1874), *Norsk, Lapp, and Finn* (1881), *In and Out of Central America* (1890), and *Actual Africa* (1895).

Vincent, George Edgar (1864-1941), American educator, son of John H. Vincent, was born in Rockford, Ill. He was graduated from Yale University (1885) and did post-graduate work at the University of Chicago (PH.D. 1896). In 1886 he became literary editor of the *Chautauqua Press*, and in 1888 vice-principal of the Chautauqua System, of which he was made principal of instruction in 1898. He was president of the Chautauqua Institution from 1907 to 1915 and honorary president after 1915. He was successively instructor (1895-6), assistant professor (1900-04), and professor of sociology (1904-11) in the University of Chicago, and was dean of Junior Colleges (1907) and of the faculties of arts, literature, and science (1907-11). He was president of the University of Minnesota from 1911 to 1917, when he accepted the presidency of the Rockefeller Foundation, retiring in 1929. He published *Social Mind and Education* and *An Introduction to the Study of Sociology*, the latter with Albion W. Small.

Vincent, John Heyl (1832-1920), American Methodist-Episcopal bishop, was born in Tuscaloosa, Ala. He studied at Wesleyan Institute, Newark, N. J., and was admitted to the New Jersey Conference in 1853, ordained deacon in 1855, and elder in 1857. He was pastor of churches in Illinois from 1857 to 1865, and in the latter year founded the *Northwest Sunday School Quarterly*, followed the next year by the *Sunday School Teacher*. From 1868 to 1887 he was corresponding secretary of the M. E. Sunday School Union and editor of the M. E. Sunday School publications. He was an organizer of the Chautauqua Assembly in 1874, and of the Chautauqua literary and scientific circle in 1878, and chancellor of the system after 1878. In 1888 he became a bishop, and in 1900-04 was in charge of the European work of his church, with residence in Zürich, Switzerland. Besides preparing numerous works for Sunday school use, he published *The Chautauqua Movement* (1886), *The Church School and its Officers* (1886), *The Modern Sunday School* (1887), *In Search of His Grave* (1893), *Unto Him* (1899), and *Family Worship for Every Day in the Year* (1905).

Vincent, Marvin Richardson (1834-1922), American divine, was born in Poughkeepsie, N. Y., and was graduated (1854) from Columbia. He taught the classics in the Columbia grammar school until 1858, and in 1858-60 was professor of Latin in the Methodist University, Troy, N. Y. He en-

tered the Methodist ministry in 1860, but three years later became a Presbyterian. He was pastor of the First Presbyterian Church at Troy from 1863 to 1873, and of the Church of the Covenant, New York City, from 1873 to 1888, when he accepted the chair of New Testament exegesis and criticism in Union Theological Seminary. Among his many theological works are *The Two Prodigals* (1876), *Faith and Character* (1880), *The Expositor in the Pulpit* (1884), *Word-Studies in the New Testament* (1887-1900), *Biblical Inspiration and Christ* (1894), and *A History of the Textual Criticism of the New Testament* (1899). He also translated Dante's *Inferno*.

Vincent de Paul, Saint (1576-1660), French priest, was born in Pouy, in Gascony. After numerous adventures, he settled in Paris (1609), where Margaret of Valois employed him as her almoner. He became curé of Chantillon les Dombes and there began the charitable work for which he became famous, by establishing the first conference of charity for the assistance of the poor. Having entered the service of M. de Gondi, general of the French galleys, he became interested in conditions among the convicts, secured an appointment as royal almoner of the galleys, and carried on important work there. He also conducted numerous missions among the poor of the Gondi estates, and as an outgrowth of this work founded (1625) the Congregation of Priests of the Mission, known also as Lazarists. In 1634 he created the Sisters of Charity, the first association of uncloistered women living by rule, and devoted to the care of the sick and poor. He was beatified in 1729, and canonized as a saint in 1737. His festival is on July 19.

Vincent's Angina, a diphtheroid affection of the mouth and throat, of bacterial origin, characterized by ulceration of the mucous membranes. It is usually sudden in onset and accompanied by some malaise—headache, backache and pain. In severe cases sloughing of the marginal gingivae occurs.

Vindhya, a series of mountain ranges forming the northern scarp of the Deccan in India. Altitude, 1,500 to 4,500 ft.

Vine. See **Grape**.

Vinegar, the weak solution of acetic acid that is obtained by the oxidation of a dilute alcoholic liquor by the aid of the micro-organism *Bacterium aceti*. The liquors most often fermented are cider, a special kind of beer, from which 'malt' vinegar is obtained, and an inferior wine, from which

'white vinegar' or 'wine vinegar' is prepared. In the slow or Orleans vinegar process the liquor is exposed in casks to the air, which is admitted through perforations. The process is assisted by periodical additions and removals of liquor, and lasts about six months. In the 'quick' process the solution, generally a malt liquor or diluted spirit containing bran or rye extract, is made to trickle through vats containing shavings which are covered with *Mycoderma*.

Vinegar Eel (*Anguillula aceti*), a small nematode, commonly found in weak vinegar. See NEMATODES.

Vinegar Hill, a hill 380 ft. high, in county Wexford, Ireland, 14 m. n. of Wexford. It was the scene of the defeat of the Irish insurrectionists by General Lake, June 20, 1798.

Vineland, borough, New Jersey, Cumberland co., on the Central of New Jersey and the Pennsylvania Railroads; 31 m. s. of Camden. It is the seat of the State training school for feeble-minded children, the State institution for feeble-minded women, and the State home for disabled soldiers and sailors. It has a public park of 45 acres and some fine public buildings, including the high school, city hall, public library, and the home of the Vineland Historical Society. Important industries are poultry raising and the manufacture of chemical glassware, shoes, rugs, chenille curtains, clothing, pearl buttons, thread, paper boxes and iron castings; p. 8,155.

Vines, Richard (c. 1585-c. 1651), American colonist, was born near Bideford in Devonshire, England. In 1609 he was sent to New England to explore the country, and after his return to England appears to have been appointed agent by Sir Ferdinando Gorges. He went out once more to New England about 1615 and settled at Winter Harbor near the Saco River. Sometime before 1635 he became principal superintendent of Saco, and in that year councillor of New Somersetshire. In 1642 he explored the White Mountains; he administered the affairs of the Maine settlements in 1643; and was deputy governor in 1644 and 1645. He returned to England in 1645, and later became a planter and physician in Barbados.

Vinet, Alexandre Rodolphe (1797-1847), Swiss theologian and critic, was born in Ouchy, in the canton of Vaud. He became professor of French at Basel in 1817 and professor of theology at Lausanne in 1837. In 1845, having associated himself with the Free Church of Vaud, he resigned

his professorship. As a critic of French literature, Vinet held a high place. His best books are *Christian Philosophy* (1846), *Vital Christianity* (1846), *Gospel Studies* (1851), *Pastoral Theology* (1852), *Studies in Pascal* (1859), *Outlines of Philosophy and Literature* (1865)—all translated into English. His *Letters* were published by Secretan and Rambert (1882), and by De Pressensé (1890).

Vineyard Sound, Massachusetts, separates the island of Martha's Vineyard from the Elizabeth Islands, off the southeast coast of the State. It is about 20 m. long and from $3\frac{1}{2}$ to 7 m. broad, and is the usual course for coasting vessels.

Vingt-et-Un, a card game somewhat similar to baccarat, except that every player holds a hand and plays for himself alone. One of the players takes a bank, and is prepared to wager that the two cards he deals himself will come nearer 21 in face value of pips than the cards he deals to any other player. Face cards count as 10, aces as 11 or 1. A 'natural,' the best hand to hold, is composed of an ace and a card counting as a 10. The banker deals two cards, in two rounds, to the players and himself. If he has not a natural, he offers a card to each player, having a right himself to draw a card. If he or a player draws and makes a total of more than 21, the player or the banker loses his stake. The banker, not having a natural and not having overdrawn, pays the players whose total of pips is greater than his, and the other players pay him. In case of equality the banker has the advantage. A natural is very generally paid double, but this and the formation of a pool to go to the first natural are matters to be agreed upon by the players.

Vinh, town, capital of the province of Vinh, French Indo-China, 10 m. from the sea, midway between Hanoi and Hué; p. 16,000. The province has a population of 1,200,000.

Vinita, city, Oklahoma, county seat of Craig co., on the Missouri, Kansas and Texas, and St. Louis-San Francisco Railroads; 60 m. n.w. of Tulsa. It is the seat of a State hospital for the insane. It has a large oil refinery and is the commercial center of a stock-raising and agricultural region; p. 5,518.

Vinland, or **Wineland**, the name given by the Norse explorer Leif Ericson in the eleventh century to a part of America along the Atlantic coast, on which grapes were found growing. The region has never been definitely identified. The neighborhood of Boston has been fixed upon by some, and

memorials to Leif Ericson have been erected there; others declare the land to have been Nova Scotia, and as late as 1920 it was claimed that Vinland lay north of the St. Lawrence.

Vinson, Frederick Moore (1890-1953), U. S. public official. Director Economic Stabilization (1943-45); of War Mobilization (1945); Secretary of Treasury (1945-46); Chief Justice U. S. Supreme Court (1946-53).

Viol, the generic name given to the immediate precursors of the violin, viola, violoncello, and double-bass. From the first three of these the viol differed in having a flat back, slanting shoulders, sound-holes of another form, and a greater number of strings. The double-bass has the flat back and contour of the viol, but sound-holes like those in the violin.

Viola, or **Tenor Violin**. See **Violin**.

Violet (*Viola*), a genus of low, mostly perennial herbs, bearing alternate or radical leaves and solitary flowers with five irregular petals, the lower one being spurred at the base and the two lateral ones opposite and equal. There are numerous species, all belonging to temperate climates. The Sweet or English Violet (*V. odorata*) is extensively cultivated in the United States. The stems, which are downy or smooth, spring in tufts from a thick root stock. The leaves are large, and the flowers are generally deep purple, though varieties are cultivated with blossoms of white and of varying shades of blue. Double varieties are also common. In growing violets, the stock plants should be divided, about the end of April, into single crowns, and these should be planted at nine-inch intervals in rows twelve inches apart.

Viola tricolor is an Old World species (see **PANSY**), of which a strain (*V. tricolor arvensis*) has become naturalized in parts of the United States, where it is known as Johnny-Jump-Up. The Sweet White Violet (*V. blanda*) and the Lance-leaved Violet (*V. lanceolata*) are the American species bearing small, faintly fragrant flowers in the spring. They are found from New England and the Great Lakes regions southward. Other varieties are the Canada Violet (*V. canadensis*), with star-like white flowers, purple-tinged; the exquisite Bird's Foot (*V. pedata*), with pedately parted leaves, and broad flowers, tinted with every imaginable shade of blue, lavender, and white; the early *V. palmata* and *V. sagittata*, whose leaves grow enormously after flowering; the quaint spurred violets, as the Dog Violet (*V. labradorica*) and the delicate,

veiny *V. rostrata* and yellow-flowered Round-Leafed Violet (*V. rotundifolia*), and Downy Yellow Violet (*V. pubescens*).

Violet Rays. See **Spectrum**.

Violin, a stringed instrument played with a bow, probably first made by Gasparo Bertolotti—better known as Gasparo di Salò—(d. 1610) of Brescia, Lombardy. It has a hollow, resonant, oblong body, narrower in its upper portion, consisting of a back and a breast—both of which are convex—attached to and slightly overlapping narrow sides or ribs. The upper and lower extremities are rounded, and on each side of the instrument, a little above its center, are two inward curves, formed somewhat like the letter C. The narrow portion between the curves is termed the waist. On the breast in the lower portion of, and extending a little below, the waist, there are two longitudinal incisions, one on each side, formed like the letter *f* and called *f* or sound holes. Attached to the center of the upper part of the violin is a neck, the prolongation of which is a head, usually terminating in the form of a scroll. An ebony finger-board and nut—a narrow ridge containing four tiny grooves placed at the upper end of the finger-board—are glued to the flat surface of the neck. The head contains four tuning pegs, two on each side, to which the upper ends of the strings are secured, the lower ends being fastened in a tail-piece attached to the bottom of the instrument.

In the inside of the violin there are four small blocks, which fill up the respective corners. A larger block placed at the center of the lower end contains the tail-pin. A similar block is placed at the center of the upper end, and to this the neck is attached. The back at this part contains a small semicircular projection, termed the button. The lower end of the neck is let into the block, so that the under horizontal surface of the neck rests against this button and against a portion of the back; by this means the neck is firmly united to the body of the instrument. The sides are bent to shape, and are only about 1/16 in. thick. To strengthen these, and also to provide a broader surface for the attachment of the back and breast, the parts between the blocks have their edges thickened by means of tiny strips of wood called linings, which are bent to fit the inner curves of the sides, and are glued to them. The blocks and linings are usually made of pine, but willow, lime, and cedar are also used for these parts. The bass-bar is a little

beam of pine, glued longitudinally but somewhat obliquely to the inner surface of the breast, and in such a position that the left—or G string—foot of the bridge is over the center of the bar. The proportions and adjustment of the bass-bar require the nicest calculation in order to secure the best tonal results. The sound-post is a small movable pillar of pine, usually about $\frac{1}{4}$ in. in diameter, which stands upright between the back and the breast. It is usually from $\frac{3}{8}$ in. to $\frac{1}{4}$ in. behind the right foot of the bridge—*i.e.* nearer the lower end of the instrument. If a violin is too high in build, the tone lacks volume; if too low, it lacks sympathetic quality; and in both cases the balance of tone between the upper and lower registers is unequal. Many of the best violins of Stradivari and Giuseppe Guarneri have a total depth of about $2\frac{3}{8}$ in., the height of arch in back and breast being about half the height of the sides.

The breast is always made of pine, and may be of one thickness throughout, but is frequently thickest at the center. The back, sides, neck, and head are almost invariably made of maple or sycamore, but may be of beech and of birch. If the back and breast are too thin, the tone of the violin lacks solidity, and is easily played out; if too thick, the tone is thin and shrill, besides being difficult of production. The strings are raised above the lower end of the finger-board, and have their vibrations communicated to the instrument by means of the bridge, which is movable and cut from a single piece of maple. It received its present form from Stradivari, and its artistic design is necessary to its properly fulfilling its functions. The exterior of the violin is coated with varnish, which not only enhances the beauty of the instrument, but greatly affects its tone. Oil varnish gives better results than spirit varnish. Cremona violins are famous for the quality of their varnish, but after 1760 its secret seems to have been lost. An ordinary full-size violin is 14 inches in length of body, exclusive of the neck and head. The length of string from nut to bridge should not be more than 13 inches.

The violin is strung with four strings tuned in fifths. The highest, or first, is tuned to the note E on the highest space of the treble staff; the second, third, and fourth strings are tuned respectively to the notes A, D, G, below. The strings are made of gut, but firsts of silk are also used. The fourth string is covered with spun wire, pure silver being

most in favor. In order to produce the desired intervals of pitch, the strings are stopped as required by the finger tips of the left hand. By the use of a small wood or ivory instrument, the 'mute,' a peculiarly soft tone, of muffled and tremulous quality, is obtained. Music for the violin is always written in the treble clef, and the compass of the instrument is about four octaves, but this can be extended by the use of harmonics. The violin is sounded by having its strings set in vibration by a band of rosined horse-hair.

The viola or tenor violin is about a seventh larger than the violin, and is held and played in the same manner. Its four strings are tuned in fifths, one fifth lower than the violin, its notes, numbering from the highest string, being A, D, G, C. The two lower strings are covered with spun wire, and music for the instrument is written in the alto clef. The violoncello, or 'cello, is about twice the size of the violin, but its sides are deeper in proportion. Its four strings are tuned to the same notes as those of the viola, but are one octave lower, and its two lower strings are also covered with spun wire. Music for the 'cello is written in the bass clef, the tenor and treble clefs being also used for passages in the higher positions of the instrument. The double-bass is about twice the size of the 'cello, but has a flat back and sloping shoulders. It may be strung with three or with four strings, and in either case it may be tuned in various ways. A frequent method of tuning with four strings is G for the first or highest string, and D, A, E for the second, third, and fourth strings. Music for the double-bass is written in the bass clef, usually an octave higher than the notes are to sound.

Stringed instruments by the great Italian makers are considered superior to all others. Several instruments by Antonio Stradivari have each brought \$10,000 while \$9,250 has been given for a violin made by Giuseppe Guarneri (I.H.S.). Among other distinguished Italian makers are Amati, Bergonzi, Gagliano, Grancino, Guadagnini, Maggini, Montagnana, Ruggieri, and Gasparo di Salo.

Consult Hart's *The Violin*; H. Allen's *Violin-making as it Was and Is*; W. H. Mayson's *Violin-making*; H. Saint-George's *The Bow: Its History, Manufacture, and Use* (1897); Haweis' *Old Violins*; W. M. Morris' *British Violin Makers* (1904); Ragster's *Chats on Violins* (1905); Anna Chapin's *The Heart of Music* (1906); Abele and Neiderheilmann's *The Violin: Its History and Con-*

struction (Eng. trans. 1907); Bauer's *Practical History of the Violin* (1911); Straeten's *Romance of the Fiddle* (1911); Polonaski's *Value of Old Violins* (1912).

Violoncello, or 'Cello. See **Violin**.

Vionville, village, Lorraine, Germany; 12 m. w. of Metz. It was the scene of a desperate encounter—known also as Mars-la-Tour—(Aug. 16, 1870) between the Germans under Prince Frederick Charles and the French under Marshal Bazaine.

Viper (*Vipera*), a genus of poisonous snakes, including about ten species found in Europe, Asia, and Africa. They have generally thick bodies, with peculiarly flat and heart-shaped heads, and staring, cat-like eyes. Their fangs are long, and attached to movable bones, and their bite is quickly fatal, as a rule. They range in length from 20 inches to 6 feet. The most familiar species and the most northern one is *V. pelias* (see **ADDER**). In India and neighboring countries occurs the dangerous Russell's viper or daboia (*V. Russellii*), which reaches a length of five feet. To the family Viperidae belong not only the true vipers and their allies, but also the deadly sub-family Crotalidae, which includes the rattlesnakes, copperheads, and water moccasins of North America, and the fer-de-lance and bushmaster of South America. To the sub-family Viperinae, which is confined exclusively to the Old World, belong not only the vipers in the restricted sense, but also the puff adder (*Bitis arietans*), common throughout Africa except along the northern coast, and the African horned vipers (*Cerastes*). See **PUFF ADDER**. Consult Gadow's *Amphibia and Reptiles*; Ditmar's *Snakes of the World* (1931); Pope's *Snakes Alive* (1937).

Vipsania, daughter of M. Vipsanius Agrippa and wife of Tiberius, bore the latter a son, Drusus; but in 11 B.C. Augustus caused them to be divorced, in order that Tiberius might marry his daughter Julia.

Virchow, **Rudolf** (1821-1902), German anthropologist, pathologist, and legislator, was born in Schivelbein, Pomerania. He was appointed pro-rector to the University of Berlin in 1847, and the same year was sent by the government to investigate typhus fever in Silesia. His report was so outspoken as to cause a good deal of official disquiet; and his democratic creed brought about the loss of his university appointment. He had already founded (1847) the *Archiv für Pathologische Anatomie*, which he edited until his death. He was largely responsible for the encouragement given to Schliemann in his

excavations at Troy; and he wrote two books on Troy, *Zur Landeskunde der Troas* (1880) and *Alttrajanische Gräber und Schädell* (1882). On losing his appointment in Berlin he was offered the chair of pathological anatomy at Würzburg (1849); and there he remained until, in 1856, Berlin University invited him to return. The pathological museum of the Berlin University is one of the many monuments that demonstrate his industry. Virchow's great work on *Cellular Pathology* (1858; Eng. trans.), and that on *Tumors*, which was never completed (1863-7), are his best-known books, but there is practically no department of medicine on which he has not spoken learnedly. In his *Cellular Pathology* he took for his motto '*Omnis cellula e cellula*' ('All cells from a cell'); and that was the theory on which all his medical work was based. He was the first to apply the cell theory to the consideration of diseased tissues. He was long one of the prominent leaders of the liberals in the Prussian Diet and the German Reichstag. Consult his *Life* by Beecher; *Life* in Smithsonian Institution's *Annual Report* for 1902; Karl Blind's *Personal Recollections of Virchow* (*North American Review*, 1902); Haeckel's *Freie Wissenschaft und Freie Lehre* (1908).

Viriden, city, Macoupin co., Illinois, on the Chicago, Burlington and Quincy, and the Alton Railroads; 22 m. s.w. of Springfield. Coal mining is the principal industry. There are large poultry-packing interests; p. (1940) 3,041.

Vireo, or **Greenlet**, the American birds of the family Vireonidae, distributed abundantly in temperate North America, Mexico, and Central America as far south as Costa Rica, and in the Antilles. There are about 70 species, and 200 varieties. They are allied to the waxwings, but are much smaller. The plumage is prevalently olive, or olive green, with brown and gray, and buff or whitish underneath, never streaked or spotted. The vireos are mainly insectivorous, but feed occasionally on fruit and berries, and they are migratory. The nests are deeply pensive, formed of grapevine bark or similar material, and lined with mosses and lichens. They are hung by the rim to the fork of a low branch, from three to five feet from the ground. The eggs are an elongated oval, and white speckled with red and purple. Some species have a pleasing song, others are noted for the oddity of their notes. The red-eyed vireo (*V. olivaceus*), common through-

out temperate North America in the summer, is a type of the whole family.

Virgil, or **Vergil** (70-19 B.C.), whose full name was **Publius Vergilius Maro**, the greatest of Roman poets, was a native of Andes, near Mantua. The correct spelling of the name in Latin is with an *e*, not with an *i*; the spelling *Virgilius* is first found in the fifth century A.D., and acquired vogue after the ninth century. He was given a good education at Milan and in Rome (after 53 B.C.), where the Emperor Augustus was his fellow pupil, it is said. In 41 he went to Rome, and became one of Maecenas' circle of friends, among the members of which were the poets Horace and Varius. The rest of his life was spent in literary work and study. His *Georgics* appeared about 30 B.C.; and his remaining years were devoted to the composition of his *Aeneid*. He died at Brundisium.



Bust of Virgil.

The *Bucolics*, mostly descriptive of rustic life, are imitations, almost translations, from Theocritus. The *Georgics* deal with agriculture, arboriculture, domestic animals, and bees and bee keeping. It is a didactic poem, much influenced by Hesiod; but the skill with which the topics are elevated and idealized, and the beauty of its episodes, make it the most perfect of the greater works of Roman poetry.

The *Aeneid*, begun in 29 B.C., was finished, but lacked final corrections at the poet's death. Its subject is the settlement of Aeneas

in Italy, after the destruction of Troy. The first six books resemble the *Odyssey*, the last six the *Iliad*; but the fourth owes much to Apollonius Rhodius' *Argonautica*. The story of Aeneas was not a living Roman legend, though it had been officially adopted at Rome for two centuries; and Virgil himself was not naturally fitted to be an epic poet. Hence there is an air of effort and unreality about the whole work. The battle scenes, above all, are clearly written by a student, not by a man of action; the imitation of Homer is too obvious. Yet the poem remains the noblest monument of Roman character and of Roman poetic genius. One great charm of the poem is the frequent expression in perfect language of thoughts, common indeed, which touch the human heart in every age; and above all, there is the unsurpassable Roman dignity which colors the whole poem, maintained and expressed by the poet's perfect command of language and rhythm. From the point of mere style the poem has never been surpassed. In 1930 the Bi-millennial Anniversary of the birth of Virgil was celebrated throughout the world. The minor works ascribed to Virgil are *Culex* and *Ciris*, two small epic poems; *Moretum*, a description of a peasant's breakfast; *Copa*, 'mine hostess,' a short elegiac poem in a sprightly tone; and *Catalepton*, short poems on various subjects. Of all these poems no more can be said here than that they date from Virgil's time, and quite well may be his work. Virgil at once gained the greatest reputation; his works were regularly studied in schools, and later consulted as oracles. In the Middle Ages Dante regarded Virgil as his chief teacher; and in popular tradition he was considered the greatest of magicians and necromancers, owing to the use of his poems as oracles. The scene of his exploits was Naples, which, as the place of his burial, was the origin of these legends. Good editions of Virgil are numerous. Translations have been made into English verse by Dryden, Palmer (*Bucolics*), Bowen (*Bucolics* and *Aeneid*, I.-VI.), Rhoades (*Aeneid*), Conington (*Poems; Aeneid*), Morris (*Aeneid*); and into English prose by Conington and Mackail.

Consult Jean d'Outremeuse's *Les Faits Merveilleux de Virgile*, a fifteenth-century work (modern ed.); Comparetti's *Virgil in the Middle Ages*; Henry's *Aeneidea*; Nettleships' *Introduction to the Study of Virgil and Ancient Lives of Virgil*; Sellar's *Roman Poets of the Augustan Age*; Tunison's *Mas-*

ter Vergil; Boissier's *The Country of Horace and Vergil*; Leland's *Legends of Vergil*; Glover's *Studies in Virgil* (1904); Woodberry's *Great Writers* (1912); Frank's *Virgil: A Biography* (1922); Mackail's *Virgil and His Meaning to the World of Today* (1923); Prescott's *Development of Virgil's Art* (1927); Schauroth's *Observations on Virgil and His View of Life* (1932).

Virginal. See **Spinnet**.

Virginia (popularly called the 'Old Dominion'), a South Atlantic State of the United States, and one of the original thirteen. It is bounded on the north by West Virginia and Maryland; on the east by Maryland and the Atlantic Ocean; on the south by North Carolina and Tennessee; and on the west by Kentucky and West Virginia. The Potomac River forms the boundary line with Maryland. The total area is 42,627 sq. m., of which 2,365 are water-surfaced.

Topography.—Virginia is divided into three regions known as the Coastal Plain, the Piedmont Plain, and the Appalachian Plateau. The first of these includes all of the eastern peninsula and the low, level portion extending westward 50 to 150 m. from the ocean and Chesapeake Bay. It rises by a more or less well-marked escarpment to the Piedmont Plain, which extends westward to the foot of the Blue Ridge. The Piedmont is more diversified than the Coastal Plain, varying in altitude from 200 to 1,000 feet. The Blue Ridge extends in an almost continuous chain across the State from northeast to southwest, and has a general elevation of about 2,500 feet. Along the western boundary are ranges of the Alleghany and Cumberland Mountains. Lying west of the Blue Ridge is the Great Valley. In the southwest the Plateau region broadens, and is traversed by a number of parallel ranges separated by narrow valleys. Here are the highest elevations in the State—Rogers Mountain (5,719 ft.) and White Top (5,520 ft.).

Among the rivers draining the Piedmont and Coastal Plains are the Potomac, the Rappahannock, the York, and the James, which receives the Appomattox as its chief tributary. A number of rivers flow south-eastward into North Carolina, among them the Blackwater and the Nottoway, forming the Chowan, and the Staunton and the Dan, forming the Roanoke. The Shenandoah River drains the northern part of the Plateau region, and empties into the Potomac. Situated in the southeast corner is the great Dismal Swamp, in which is Lake Drummond.

Climate and Soil.—The climate is fairly free from extremes of heat and cold. That of the highland region is pleasant and healthful throughout the year, but the low coastal belt is hot and sultry during the summer months. The mean annual temperature for the State is about 59° F. The mean winter temperature is 40°; the mean summer temperature, 77°. The average annual precipitation at Norfolk is 52 inches; at Lynchburg, 42.8 inches; and at Staunton, 38 inches.

The soil of the Coastal Plain is generally light, being composed of sand, gravel, and clay; that of the Piedmont Plain is heavier, easily tillable, and fairly fertile, being composed of weathered metamorphic rocks and clay, while that of the Great Valley is noted for its richness, consisting mainly of eroded and decayed limestone, which forms the valley floor. Considerable alluvial deposits are found in the valleys of the rivers in the Coastal Plain.

Geology.—There is close correspondence between the topographical divisions of Virginia and the geological formations. The oldest strata are the Archæan granites, gneisses, syenites, and greenish metamorphic rocks of the Piedmont Plain. East of this is the Coastal Plain, consisting of Tertiary and Quaternary deposits of sand, gravel, and clay. An area of coal deposits in Goochland, Henrico, Powhatan, and Chesterfield counties, on the eastern border of the Piedmont Plain, is of Triassic formation, and here covers the older Archæan rocks. In the Appalachian plateau the Palæozoic rocks prevail. The Blue Ridge contains the oldest rocks, being formed of the Potsdam series of the Cambrian epoch. The other ranges have Devonian sandstones and limestones along their crests, while Silurian limestone lines the valley floors.

Public Welfare and Health.—In 1938 Virginia adopted a public assistance act providing for general relief, old-age assistance, aid to dependent children, and relief for the blind. The appropriations for the first year were \$1,538,000 and for the second year \$1,788,000. Ninety-two counties and 23 cities applied for \$808,656.67 to which would be added local funds of \$727,099.55. The total state expenses for welfare in the 1938 fiscal year amounted to \$5,901,398.73. In that year all-time low records were made by malaria, typhoid fever, paratyphoid, diarrhea, and dysentery. Almost half of the people of the state were served from public water supplies. There were 61 maternal and child health

clinics in operation. In 1938 the State spent \$1,514,908.47 on public health.

Mining.—Virginia ranks 25th among the States in the value of its mineral products. Virginia ranks second in the amount of pyrite; third in the production of manganese ore, calcareous ore and scrap mica, fourth in sheet mica. It was the sole producer in the United States of titanium ore (ilmenite and rutile). Coal is by far the most important mineral of the State. The first bituminous coal mined in the United States was taken from the Richmond basin, near the city of Richmond, late in the 18th century. Most of the present product comes from the Richmond basin.

Banks and Banking.—The State had 129 national banks and 182 licensed state banks in 1940. The national banks had total assets of \$400,000,000 and the state banks assets of \$300,000,000, a combined total of \$700,000,000. The total deposits were \$600,000,000, the total surplus amounted to \$25,000,000, and undivided profits \$10,000,000. The total assets of loan associations amounted to \$59,000,000. The state treasury balance of June 30, 1940, was \$10,000,000 and the gross bonded debt was \$18,000,000.

Forestry.—Forests of distinct types formerly covered each of the three topographical regions. Yellow pine prevailed in the Coastal Plain; oak and white pine in the Piedmont Plain; and white pine, hemlock and hard woods in the western plateau. It is estimated that about 14,000,000 acres can be classed as growing forests. These are: in the Alleghany Mountains in the border counties from Rockingham to Wise counties inclusive, where hard woods predominate; in the greater part of the Piedmont Plateau (chiefly hard woods and yellow pine), and in the Coastal Plain (mostly loblolly pine).

Fisheries.—In the total value of its fishery products, Virginia ranks fourth among the States. In the value of its menhaden it ranks first. The taking of oysters is the most important branch of the fishing industry, the product being valued at \$2,340,024 (fresh-shucked) annually, and \$235,039 for oyster shell products. Shad, croakers, squeteagues or sea trout, hard clams, soft crabs, and alewives also are taken. Fisheries are conducted at nearly every available point along the Atlantic Coast but the most important are in Chesapeake Bay and its tributaries.

Agriculture.—According to the 1930 Federal Census there were 170,610 farms in Virginia, comprising an area of 16,728,620 acres,

or 64.9 per cent. of the total land surface. This represents a decrease of 1,832,492 acres since 1920. The value of farm property including land, buildings, implements and machinery, was \$900,168,925—a decrease of \$174,417,566 (16.2 per cent.) in the decade. Idle or fallow land comprised 6,695,156 acres.

Cereals and tobacco are the most important crops. Among the cereals corn ranks first, representing about 40 per cent. of the cultivated area and producing about one-fourth the total value of farm crops. Hay is second in acreage and fourth in value, representing about one-fourth of the cultivated area. Tobacco was the leading agricultural product until 1927 when this crop fell to third place.

The acreage and yield of these and other crops annually are: Corn, 1,527,000 acres, 34,800,000 bushels; tobacco, 163,000 acres, 103,449,000 pounds; hay and forage, 1,200,000 acres, 1,300,000 tons; white potatoes, 118,000 acres, 10,401,000 bushels; wheat, 603,000 acres, 8,624,000 bushels; peanuts, 152,000 acres, 145,225,000 pounds; sweet potatoes, 38,000 acres, 3,990,000 bushels; cotton, 71,000 acres, 17,000 bales lint, 8,000 tons cottonseed; oats, 189,000 acres, 1,892,000 bushels.

Excluding potatoes and sweet potatoes, the acreage devoted to vegetables in 1940 was 79,000, and their value was \$6,000,000. The value of the fruit and nut crops in 1940 was \$12,000,000. Virginia's apple crop was 11,000,000 bushels in 1940 being surpassed only by Washington and New York. In the same year the production of grapes amounted to 1,980 tons; strawberries, 370,000 crates valued at \$765,900.

Stock Raising.—The 1930 Census showed the value of domestic animals, chickens and bees to be \$92,655,766. The numbers and value of the principal farm animals were: Cattle, 782,000, \$21,706,000, including milk cows and heifers, 390,000, \$13,650,000; horses and colts, 195,000, \$12,373,000; mules and mule colts, 93,000, \$7,834,000; swine including pigs, 551,000, \$3,343,000; sheep and lambs, 485,000, \$2,212,000. Poultry raised were valued at \$12,500,000 in 1940; bees at \$350,000 in 1940. The wool clip was valued at \$400,000 in 1940. The dairy industry is important; the total value of butter, cream and whole milk sold in 1940 was \$12,000,000.

Manufactures.—There has been considerable advance, during recent years, in most of the manufacturing industries of Virginia. During the period of 1914-19, the value of

manufactured products increased 143.1 per cent.

The State has excellent transportation facilities, both by rail and by water; its coal fields produce an abundance of fuel; and its iron mines and forests, and its tobacco and cotton fields, together with those of neighboring States, afford an abundance of raw materials; while many of its streams afford excellent water power. These natural advantages are all favorable to the development of manufacturing.

The tobacco industry includes the manufacture of cigars, cigarettes, chewing tobacco, smoking tobacco and snuff. The 31 establishments reported in 1939 gave employment to 14,650 persons and reported products valued at \$200,000,000 or 39.1 per cent. of the total value of manufactured products for the State.

The lumber and timber products include furniture, wood turned and shaped, wood preserved, wood pulp, wooden boxes and excelsior. These industries turned out products valued at \$72,000,000 in 1940. As regards the number of wage earners in each group of manufactures the following are arranged in order of importance: textile industries (knit goods, cotton goods, silk and rayon, woolen goods); tobacco, ship and boat building; sawmill operations, furniture; railroad car construction and repairs; printing and publishing; pulp and paper manufacture (Virginia ranking first in the South); commercial fertilizers.

In 1928 the greatest air-nitrogen plant in the Western Hemisphere began producing at Hopewell, Virginia. Ammonia is the primary product, but sodium nitrate is produced in great quantity, providing the only direct competition in this country with Chilean sodium nitrate. The harbor of Hampton Roads is one of the leading centers of the shipbuilding industry in the country. Great turbo-electric driven ships have been built here. In 1930 a new plant began the construction of seaplanes and pleasure boats by mass production methods. The state's industries each year are becoming more diversified. In 1938 and 1939 many new factories were erected in Jarret, Grottoes, Pulaski, Crewe, and other cities and towns for the fabrication of insulating board, silk, hosiery, rayon, plastics, etc.

Legislation and Courts.—The principal legislation approved in the 1938 session was for public assistance, housing, and unemployment, all steps required to bring the state laws into accord with Federal regulations.

Other legislation included authorization of a new state library building, a county zoning act, regulation of advertising along highways, and the granting of greater power to the State hospital board. The salaries of judges and many court officials were increased and a voluntary retirement plan went into effect, legislation was enacted to speed up the work of the Supreme Court of Appeals, and the State bar association was made an adjunct of the courts charged with controlling the professional conduct of lawyers. The Hampton Roads sanitation district was formed to eliminate pollution in the waters of several counties, cities, and towns. Studies were started by legislative committees on apportionment of house and senatorial election districts, recodification of school and insurance laws, hunting and fishing laws, jail system, labor, and civil service.

Transportation.—The principal railroads are the Southern, the Atlantic Coast Line, the Chesapeake and Ohio, and the Norfolk and Western. Twelve Class I railroads enter the State. Of great importance to commerce are the numerous bays and the long estuaries forming the lower courses of the principal rivers. The Port of Hampton Roads, including Norfolk, Portsmouth, Newport News, Hampton and Suffolk, accommodates ships from all parts of the world. Newport News has warehouses and piers for all kinds of merchandise.

Commerce.—Hampton Roads is the second ranking port in the United States in tonnage and one of the world's finest harbors. There is a great shipbuilding industry in Hampton Roads where many naval vessels and merchant ships are constructed.

Population.—According to the Federal census taken in 1950, the total population of the state of Virginia was 3,318,680. This showed an increase of 640,907 people in ten years, since the 1940 census. The state's urban population was 40.3 per cent, which was an increase of 5 per cent over the 1940 census figures. The population according to previous census reports was as follows: (1810) 974,600; (1830) 1,211,405; (1850) 1,421,661; (1870) after formation of West Virginia, 1,225,163; (1880) 1,512,565; (1890) 1,655,980; (1900) 1,854,184; (1910) 2,061,612; (1920) 2,309,187; (1930) 2,421,851. The population of the principal cities in 1950 was: Richmond, 230,310; Norfolk, 213,513; Roanoke, 91,921; Portsmouth, 80,039; Lynchburg, 47,727; Newport News, 42,358; Petersburg, 35,054; Alexandria, 61,787; Danville, 35,066.

Education.—There is a State Board of Education, consisting of the governor, superintendent of public instruction, attorney-general, and three experienced educators, elected by the senate for four years, together with one city and one county division superintendent, chosen by the other members for two years. The State superintendent reports annually to this board. The board divides the State into divisions of not less than one county or one city each, and appoints a superintendent for each division for four years, subject to the approval of the senate. Separate schools must be maintained for white and for colored children under the same general regulations. In 1939-40 the public elementary and high schools had an enrollment of 581,000 pupils. There were 17,468 teachers. About \$28,000,000 was expended on the public schools.

Publicly controlled institutions of higher learning are the University of Virginia, at Charlottesville; Virginia Military Institute, at Lexington; Virginia Agricultural and Mechanical College and Polytechnic Institute, at Blacksburg; the Medical College of Virginia, at Richmond; and William and Mary College, at Williamsburg. A corporation backed by John D. Rockefeller, Jr., has been responsible for the restoration of Williamsburg, including William and Mary College, completed in 1934. Privately controlled are Washington and Lee University, at Lexington; University of Richmond, at Richmond; Randolph-Macon College, at Ashland; Hampden-Sidney College, Emory and Henry College, at Emory; Sweet Briar College, Randolph-Macon, Woman's College, at Lynchburg, and Bridgewater College. Colleges for colored students include the Hampton Normal and Agricultural Institute, the Virginia Normal and Industrial Institute, and the Virginia Union University, both at Richmond.

Charities and Corrections.—There is a State Board of Charities and Corrections of five members appointed by the governor. Institutions include the School for the Deaf and Blind at Staunton; three hospitals for white insane—the Eastern, at Williamsburg, the Western, at Staunton, and the Southwestern, at Marion—and one for colored—the Central, at Petersburg; Colony for the Epileptic and Feeble-minded, at Colony; Sanatoriums for White Tuberculosis Patients, at Catawba and Charlottesville; Sanatorium for Colored Tuberculosis Patients, at Burkesville; Industrial School for Boys, at Maidens;

Industrial School for White Girls, at Bon Air; the Manual Labor School for Colored Boys, at Hanover; Industrial School for Colored Girls, at Peakes Turnout; State Penitentiary, at Richmond; State Farm for Defective Misdemeanants, at State Farm. An industrial farm for women prisoners was provided in 1930. Convicts are worked on the State farm and on public roads.

Government.—The present constitution of Virginia was adopted in 1902. Amendments may be proposed in either house and must be approved by a majority of both houses of that legislature and the succeeding one, and later ratified by a majority vote of the electors. The usual qualifications for voting are in effect, in addition to the payment of a poll tax. If the voter has served in the Civil War the poll tax is omitted. The chief executive officers are the Governor, Lieutenant-Governor and Attorney-General—elected for four years, the Secretary of the Commonwealth, Treasurer, Superintendent of Public Buildings, Commissioner of Agriculture, Controller—appointed by the Governor. An Auditor is chosen for a like term by joint ballot of the General Assembly. The governor is not eligible for the next succeeding term. He has a limited power to grant reprieves and pardons. A two-thirds vote of both houses overrides his veto, which extends to any item in an appropriation bill.

The legislature, called the General Assembly, consists of a Senate of not less than 33 nor more than 40 members, and a House of Delegates of not less than 90 nor more than 100 members. The Senators are elected for a term of four years, Delegates for two years. Regular sessions convene in January of even years, and are limited to 60 days. The judicial power is vested in a Supreme Court of Appeals of seven justices, chosen by joint ballot of the General Assembly for a term of 12 years; in Circuit Courts, each having one judge, chosen by joint vote of the General Assembly for 8 years; in City Courts, and in Justices of the Peace. Under the Reapportionment Act of 1929, Virginia has 9 Representatives in the National Congress. Richmond is the State capital.

History.—Queen Elizabeth made a grant of the coast of America to Sir Humphrey Gilbert. In 1584 this patent passed to Sir Walter Raleigh, who sent out Amadas and Barlow to explore the country. After visiting the coast of what is now North Carolina, they returned to England; and the Queen, delighted at their favorable report, is said to have

named the new land Virginia. On April 10, 1606, James I. issued 'The First Charter of Virginia' to the Virginia Company, which consisted of two divisions, known as the Plymouth and the London companies, to colonize respectively the north and the south. At that time Virginia included all the land between 34° and 45° N. lat., and the London Company was assigned the region between 34° and 41° N. lat. Jamestown, on the James River, was settled in 1607—the first permanent English settlement in America. The early years were filled with suffering and misery, for the Indians were hostile, the spot selected for settlement was unhealthful, and the people quarreled over the division of the supplies. While the romantic tales concerning Captain John Smith which color this early period have been largely discarded as untrue, he did valuable service during the first two winters.

During the winter of 1609-10 the colony nearly starved to death, its numbers being reduced from 500 to 60. The next June preparations had been made to leave, when the new governor, Lord De La Warr, arrived with colonists and fresh supplies. Another charter, in 1612, added the Bermudas to the jurisdiction of the Company, and gave it full power to legislate for the colony. On July 30, 1619, the first representative assembly in America met at Jamestown. It was composed of the governor, the council, and the burgesses, of whom two were elected by the inhabitants of each town and plantation. In the Ordinance and Constitution issued by the Company in 1621, the Assembly received full powers to enact necessary laws and regulations for the welfare of the Colony, subject to the veto of the governor and of the Company. In 1619 the first slaves were brought into the Colony by Dutch traders.

From the beginning, tobacco was the staple crop of the Colony, and its cultivation was so profitable that prosperity was assured. In 1622 an Indian uprising led to the massacre of many of the settlers. In 1624 the jurisdiction of the Company was revoked by the King, and until the Revolution, Virginia was a royal colony. In 1632 Charles I. granted Maryland, which had been included in the original Virginia patent, to Lord Baltimore. In 1642 Sir William Berkeley became governor. The Colony voted the acts leading to the execution of Charles I. to be treasonable, and declared in favor of Charles II. Governor Berkeley was deposed in 1652, and until his reinstatement,

in 1660, the Virginia governors were virtually chosen by the Assembly.

During the Commonwealth in England, thousands of Cavaliers took refuge in Virginia. The grants of land increased in size, and with the growth of large estates went the increased use of slave labor. In 1670 the suffrage was restricted to 'freeholders and housekeepers,' and between 1661 and 1676 no Assembly was held in Virginia. This aristocratic tendency, the economic distress, the Navigation Acts, the misrule of Governor Berkeley, and the Indian massacres all led to Bacon's Rebellion in 1676. (See *BACON'S REBELLION*.) The leaders in the rebellion were punished with great severity by Berkeley, who had returned to power. In accordance with the instructions of Charles II., in 1676, the suffrage was restricted to 'freeholders.' In 1693 William and Mary College was founded by popular subscription. After 1700 the population of Virginia increased rapidly—a large influx of Huguenots being closely followed by an immigration of Germans from the Palatinate. The number of slaves increased from 6,000 in 1700 to 250,000 in 1750. In 1723 the Negroes and Indians were disfranchised; in 1736 the suffrage was restricted to those who had a freehold of 120 acres of uncultivated land, or 25 acres of cultivated land with a house thereon.

The westward movement brought the Virginians in contact with the French, and in 1749 the first Ohio Company was formed to make settlements in the Ohio Valley. Four years later George Washington undertook an unsuccessful mission from Governor Dinwiddie to the French posts on the Ohio, warning against further encroachments. During the French and Indian War which followed, the Virginians protected the frontiers when the regular troops proved powerless. In 1774 a conflict between Virginia and the Indians, known as Dunmore's War ended in the overthrow of the latter. In 1776 George Rogers Clark, a delegate to the Virginia Assembly, succeeded in having the region west of the mountains organized as Kentucky County. The next year he led a force of Virginians and Kentuckians into the Northwest, and his expedition resulted in the virtual conquest of the Illinois country.

Virginia was a leader among the Colonies in their resistance to 'taxation without representation' by the British Parliament. In 1765 the famous speech of Patrick Henry against the Stamp Act was delivered before the Vir-

ginia House of Burgesses; and that body passed resolutions declaring that the right of taxation belonged only to the local assembly. Having been dissolved by Governor Botetort, the Burgesses met at the Raleigh Tavern, in Williamsburg, and issued their resolutions in defiance of the Governor. In 1773 the Virginia Assembly appointed a permanent Committee of Colonial Correspondence; and in 1774 passed resolutions deprecating the Boston Port Bill, which led to its dissolution by Governor Dunmore. Its members then met at the Raleigh Tavern, and proposed a convention of all the Colonies. Local forces were raised in every district; and when Governor Dunmore attempted to seize one of the powder magazines, he was compelled by the people to seek refuge on board the English warships. A State convention recommended in May, 1776, that the Continental Congress should pass a declaration of independence; on June 15 Mason's Declaration of Rights was adopted; and on June 29 a constitution was formulated, with Patrick Henry as the first governor.

During the War of Independence, Virginia was invaded by the British forces. In 1776, Colonel Woodford defeated the invaders at Great Bridge; while in the same year the Royalist Dunmore burned Norfolk. In 1779 Norfolk was again attacked; and in 1781 Richmond was taken by a British force under Benedict Arnold, and the public buildings burned. The final campaign of the war (1781) centered about Yorktown. In March, 1785, commissioners from Maryland and Virginia met at Alexandria to discuss trade relations; and their report led to the passage of a resolution by the Virginia Assembly favoring a joint convention of delegates from the various States. The result was the Annapolis Convention of September, 1786, which issued the call for the convention that framed the Federal Constitution (1787). When the Constitution was submitted to the State it met with strong opposition; but through the efforts of James Madison it was ratified on June 23, 1788. During the first decades of the Union, Virginia furnished most of the Presidents and many other eminent men to the United States—among them Washington, Jefferson, Madison, Monroe, Marshall, the Randolphs, and the Lees.

The early history of Virginia as a State was dominated by the attempts of the people to secure a more liberal franchise, and by the demands of the western part for a more equitable representation in the Assembly. At

last, in 1830, a new constitution was framed, extending the franchise and redistributing the representation. These reforms were continued in the constitution framed in 1850. In 1831 there was a Negro insurrection led by Nat Turner (see TURNER, NAT). A majority of the people of Virginia opposed secession, as shown in the Presidential election of 1860. But when Lincoln issued his call for troops, a State convention passed the ordinance of secession, April 25, 1861, without waiting for a popular vote, and so cast Virginia's lot with the Confederacy. On May 23 the people of the eastern part of the State voted their approval; while those of the western part repudiated the ordinance, and took steps to form the State of West Virginia.

Richmond having been chosen the capital of the Confederacy, Virginia became the chief battleground of the Civil War. Among the hundreds of engagements that occurred on Virginia soil may be mentioned the first and second Battles of Bull Run, Fredericksburg, Chancellorsville, the Wilderness, Spotsylvania, Cold Harbor, Five Forks, Appomattox, and the battles around Richmond and Petersburg. Robert E. Lee of Virginia was the commander-in-chief of the Confederate Army during the war. After Lee's surrender at Appomattox, the work of reconstruction was begun. In 1868 a new constitution was framed in accordance with the Fourteenth and Fifteenth Amendments. In 1870 Federal military control was withdrawn, and Virginia again became a member of the Union. In 1907 an exposition to commemorate the founding of Jamestown, in 1607, was held in Hampton Roads.

During the early years of the 20th century Virginia kept abreast of the times in the passage of social legislation. In 1926 the taxation of land values was given to the counties and of intangibles to the State. The government was reorganized, the number of bureaus reduced, with a great saving in expenditures. In 1928 the sum of \$1,000,000 was appropriated toward the creation of Shenandoah National Park. In 1929 federal courts ruled against the residential segregation of Negroes and invalidated the exclusion of Negroes from the polls. In 1930 the boundary dispute with Maryland (alive since 1666) was settled in favor of Virginia.

In 1939 the Federal Farm Security Administration, while retaining title to the property, allocated 45,000 acres of property to the State for park purposes. The prop-

erty is located in Appomattox, Buckingham, Cumberland, and Prince Edward counties. The famous Appomattox surrender grounds, about 1,000 acres, was turned over to the National Park Service. In national politics, Virginia has been Democratic.

Bibliography.—Consult the Virginia State Library's *Bibliography of Virginia* (1932); Alstetter and Morton's *Virginia and Her Builders* (1932); Arrowood's *Thomas Jefferson and Education in a Republic* (1930); Bell's *Old Free State* (2 vols. 1927); Brown's *First Republic in America* (1901); Cappon's *Bibliography of Virginia History since 1865* (1930); Fippin's *Industrial Virginia* (1928); Fiske's *Old Virginia and Her Neighbors* (2 vols. 1900); Marx's *Virginia and the Virginians* (1930); Nutting's *Virginia Beautiful* (1930); Pate's *State Government in Virginia* (1932); Pendleton's *Political History of Appalachian Virginia 1776-1927* (1927); Sale's *Interiors of Virginia Houses of Colonial Times* (1927); Squires' *Through Centuries Three* (1929); Stannard's *Story of Virginia's First Century* (1928); Tyler's *Virginia First* (1921); WPA Writers' Project, *Virginia* (1940).

Virginia, city, St. Louis co., Minnesota, on the Duluth and Iron Range, the Duluth, Missable and Northern, the Great Northern, and the Canadian Northern Railroads; 56 m. n.w. of Duluth. The city contains a junior college established in 1921, Roosevelt High School, Carnegie Library, City Hall and Lenont Hospital. It is the center of a group of iron mines and is famous for its lumber mills; p. (1940) 12,264.

Virginia Creeper, a group of hardy climbing shrubs belonging to the order Vitaceae. They may be distinguished from the allied plants belonging to the genus *Vitis* by the pith of their branches being white, while that of *Vitis* is brown. They may be easily propagated by cuttings taken in September and placed in sandy soil under hand glasses. The Virginia creepers are largely cultivated owing to the rapidity of their growth and to the habit of their leaves turning a beautiful red color in autumn. Veitch's Virginia creeper (*Ampelopsis Veitchii*) is about the best for clinging to walls. It bears the atmosphere of cities well.

The common Virginia creeper is now called *Parthenocissus quinquefolia*, and is usually found on fences, trees, and rocks, sending out delicate trailing branches. It is frequently confused with poison ivy, but its leaves are five-parted, instead of three-parted as are

those of the ivy. It is further distinguished by the expansion at the tips of the tendrils by which it adheres to various surfaces, and by its blue berries.

Virginia Military Institute, a school for academic and military training at Lexington, Va. It was established in 1839, taking the place of the garrison previously maintained as a guard for the Western Arsenal. In 1861 the corps of cadets marched to Richmond, where they were employed in instructing and drilling volunteers. The Institute was reopened in 1862; destroyed by the Federal troops in 1864; and rebuilt in 1865, at the close of the war, when it was reopened with a much wider course of instruction. The Institute is governed by a board of visitors, consisting of the adjutant-general, the superintendent of public instruction, and 9 other members, appointed by the governor.

Under a code of regulations, based substantially on those of the U. S. Military Academy, the cadets, who constitute a military corps, observe the regular routine of duties enforced at a military post. The general courses are prescribed for the first two years, after which there is a choice of courses in civil engineering, chemistry, electrical engineering and liberal arts. There are three student classifications. (1) State cadets, who must be citizens of the State and specially appointed, are free from charge for board and tuition. (2) Virginia cadets, who must be citizens of the State, are free from charge for tuition. (3) Pay cadets defray all their expenses. State cadets who have remained at the institute for two years or more bind themselves to act as teachers in some school in the State for two years after leaving the institute, or to serve an enlistment in the Virginia Volunteers, or to serve as engineers for two years under the highway commissioner of Virginia. The institute conducts a summer school.

Virginian Deer (*Odocoileus virginianus*), the common Eastern American, or white-tailed deer, representing the cariacine type, in which the antlers are either in the form of simple spikes, or, when branched, have no brow tine, always divide in a forklike fashion, and have the anterior prong directed forward. This deer ranges throughout North America, and occurs in several well-marked varieties, which are sometimes given specific rank. The deer stands about three feet to the shoulder, with antlers 20 to 24 inches long. The general body color in summer is bright rufous chestnut with a black band on the chin and throat; the under parts and the inside of the legs are

white. In winter the top color becomes gray, and hunters then speak of the animal as being in its blue coat. A marked characteristic at all seasons is the pure white of the long hairs on the under surface of the tail and the adjacent parts of the buttocks. When a deer is alarmed or excited the tail is turned up, displaying conspicuously the white, and forming a 'flag' which signals for attention on the part of all the other deer in the neighborhood.

This deer is for the most part a forest-keeping animal, especially in winter, when it feeds almost wholly upon the leaves and twigs of trees; but in spring it comes out to the glades and pond banks. In the open regions of the West it is found almost alone in the willow-covered river bottoms. One or two fawns are born annually in the spring, and are spotted. The flesh of this deer is excellent venison, and the hide is serviceable for making buckskin leather.

Virginia Polytechnic Institute and Agricultural and Mechanical College, an unsectarian State institution located in Blacksburg, Virginia, founded in 1872 under the provisions of the Morrill land grant of 1862. The agricultural experiment station was made a department of the Institute in 1888, and under the provisions of the Smith-Lever Act, the General Assembly of 1914 directed that all departments of extension work in Virginia should be centralized at that institution. Undergraduate courses are offered leading to the degree of B.S. These courses include business administration, secretarial work, biological sciences, chemistry, geology, metallurgy, agricultural economics, agricultural education, agricultural engineering, agronomy, animal husbandry, dairy husbandry, horticulture, home economics, and architectural, chemical, civil, commercial, electrical, mechanical, and mining engineering. Graduate courses leading to the degrees of M.S., C.E., C.H.E., M.E., E.M., and E.E. are also offered. By Congressional Act a Reserve Officers' Training Corps was established, and the college has been given the highest rank of the United States War Department, namely, that of 'Distinguished College.' The library contains more than 39,000 bound volumes and 20,000 pamphlets. An engineering experiment station was organized in 1921, and extension service for industry as well as for agriculture is maintained. Since 1922 the college has been open to women.

Virginia Quail, or **Bobwhite**, a member of the sub-family *Odontophoridae*, which includes American game birds that are quail-

like in appearance and sometimes called partridges. As winter comes on they withdraw into thickets and wooded bottom lands. They roost on the ground, tail to tail, with heads pointing outward. The bobwhites rely upon their coloring for protection, taking wing only as a last resort. About May 1 they begin to pair, making their nests for the most part on the bare ground or cultivated fields. See **QUAIL**.

Virginia Resolutions, The, resolutions adopted by the Virginia legislature in December, 1798, as a protest against the Alien and Sedition Acts. The resolutions, nine in number, were written by James Madison. In part they read: 'That this assembly doth explicitly and peremptorily declare that it views the powers of the Federal Government, as resulting from the compact to which the States are parties, as limited by the plain sense and intention of the instrument constituting that compact, and as no further valid than they are authorized by the grants enumerated in that compact; and that in case of a deliberate, palpable, and dangerous exercise of other powers not granted by the said compact, the States which are parties thereto have the right, and are in duty bound, to interpose, for arresting the progress of the evil, and for maintaining within their respective limits the authorities, rights, and liberties appertaining to them.' The Resolutions were sent to the legislatures of the other States; some of which replied, but none favorably.

Virginia Snake-Root. See **Aristolochia**.

Virginia, University of, an undenominational institution of learning for men at Charlottesville, Va., chartered in 1819, and opened to students in 1825. Thomas Jefferson was the first rector, and the characteristic architectural effect of the University is due to his plans. Jefferson's idea was a collection of independent schools, with a separate pavilion for each professor, and the dormitories of the students grouped around the pavilions. For the first 80 years the affairs of the University were administered by the faculty and its chairman, under the direction of the board of visitors and the rector; and it was not until 1904 that the first president, Edwin Anderson Alderman, was elected.

The University comprises 24 schools, and offers the usual academic courses and courses in engineering, law, medicine, and agriculture. The degrees of B.A., M.A., M.S., PH.D., LL.B., B.S., M.D., C.E., M.E., and E.E. are conferred. All courses are elective, and all examinations held by the University, including those for ad-

mission, are conducted under the honor system. Public speaking and debate are practiced by two literary societies of long standing, the Jefferson and the Washington, which together form the Debating Union and maintain the *University Magazine*. In 1926, through a Laura Spelman Rockefeller Memorial gift of \$137,500, the University was enabled to make a five-year research study in the social problems of the State. For recent statistics see table under the heading UNIVERSITY.

Virgin Islands, formerly the **Danish West Indies**, part of the Leeward Islands, West Indies, lying 60 m. e. of Porto Rico, were purchased by the United States in 1917 because of their strategic value in defense of the Panama Canal. The price paid to Denmark was \$25,000,000. They comprise about 50 islands, only three of which are large enough to be considered except on hydrographic charts; area 132 sq.m. These are St. Croix, St. Thomas, which has one of the finest harbors in the world; and the smaller island of St. John. St. Croix, the largest island of the group, is the only one which is important agriculturally. Its chief products are sugar cane and cotton. Cattle raising is also an important industry because of the excellent pasturage in the more mountainous parts, and the growing of tropical fruits is being begun on a fairly large scale. St. Croix is a well developed island having many miles of good roads and two towns of importance, Christiansted and Frederiksted. The inhabitants of the other islands earn their livelihood chiefly by fishing. The coaling of steamships is an important occupation of St. Thomas, which was formerly the commercial metropolis of the West Indies. St. John was for many years famous for its bay rum, but is now being outrivalled by its West Indian neighbors. In 1935 Lawrence W. Cramer became Governor of the islands. He was succeeded by Charles Hargood in 1941.

The Virgin Group was discovered by Columbus in 1492, since which time the inhabitants have been under Spanish, British, French, Dutch, and Danish rule. The efforts of the United States to gain possession of the Danish islands began in 1865, when Secretary Seward offered \$5,000,000 for them. The final act in more than 50 years' effort was completed on March 31, 1917, when Secretary Lansing handed the Danish minister a treasury warrant for \$25,000,000, the agreed purchase price, and the possessions passed under the

authority of the United States; p. 22,012, mostly Negroes.

Virginus Affair. On Oct. 31, 1873, the steamer *Virginus*, a filibustering vessel flying the American flag, while on her way from Kingston, Jamaica, to Cuba, was captured on the open sea by the Spanish war steamer *Tornado*, and taken into Santiago de Cuba, on charges of carrying men and supplies to Cuban insurrectionists. On Nov. 4, four of those on board, after an alleged trial, were shot; and three days later Captain Fry, 36 of his crew, and 16 passengers met a like fate. The affair created intense excitement in the United States, and President Grant authorized the Navy to be put on a war footing. President Castelar of Spain was able to show that the executions had been unauthorized by the home government, and that an order to stay proceedings had been despatched by him, but had arrived too late; and after diplomatic negotiation the matter was settled peacefully. By the terms of this agreement the *Virginus* and the survivors of her vessel and crew were restored forthwith; the Spanish government proceeded against such of her officials as had infringed on Spanish law or treaty obligations; and Spain was to salute the U. S. flag unless she could prove that the *Virginus* was not entitled to fly the American flag. England, some of whose subjects had been shot, exacted an indemnity.

Virgin Mary. See **Mary the Virgin**.

Virgin Queen, a popular name given to Queen Elizabeth of England. See ELIZABETH.

Virgin's Bower, the name of several species of clematis, especially the American climber (*C. virginiana*), and the traveller's joy (*C. vitalba*) of English roadsides and hedges. See CLEMATIS.

Virgo, the sixth sign of the Zodiac, an ancient constellation, entered by the sun about Aug. 21, and visible only in the spring and summer months. The figure primitively represented the Euphratean goddess Ishtar; but Aratus identified it with Astræa, daughter of Aurora and goddess of Justice, and other Greek writers with Demeter or Persephone. In Egyptian mythology Virgo is associated with Isis, who is said to have dropped a sheaf of corn as she fled from the monster Typhon.

Viridian, or **Guignet's Green**, a hydrated chromium sesquioxide, obtained by decomposing borate of chromium with water. It is a permanent, harmless, and rich-colored pigment.

Virtues. See **Cardinal Virtues**.

Virus, in medicine, the poison produced in the body during the course of an infectious disease. It can, by inoculation, excite the same disease in another. See BACTERIA; POISONS; VACCINATION; INFECTION.

Visayas, or **Bisayas**, the central insular group of the Philippine Islands, lying between Luzon and Mindanao, and including Bohol, Cebu, Leyte, Masbate, Negros, Panay, Romblon, and Samar, and many other important dependent islands. For the most part they are elevated portions of submerged mountain ranges. The highest peak is in Panay, 7,000 feet above sea level. They have a total area of 24,747 sq. m. and a population of nearly 3,000,000. Iloilo is the most important port.

The principal exports of the archipelago are copra, hemp, sugar cane, tobacco, coffee, rice, cotton, corn millet, sweet potatoes, cocoa and vegetables. Hard woods grow in abundance; coal, gold, silver, and iron are mined; there are pearl fisheries; stock raising is carried on, and there are sugar and rice mills, and considerable manufactures, especially of textiles. The group is named for the predominant race. See PHILIPPINE ISLANDS.

Viscacha, **Bizcacha**, or **Pampas Hare** (*Lagostomus trichodactylus*), a South American burrowing rodent, nearly allied to the chinchilla but found only in the open pampas, Viscachas have five toes on the fore feet and three on the hind, and are strongly and somewhat clumsily built. The length of the head and body on a full-grown animal is about 23 inches, of the tail about seven inches. The colors are varied, and the fur has a commercial value. They are nocturnal, social, and construct elaborate warrens. They are much disliked by the sheep farmers, whose pastures they frequently destroy. Owls and other birds live in or near the burrows, and they are the prey of pumas and smaller wildcats, foxes, dogs, and the like.

Visceroptosis, or **Glénard's Disease**, a disease characterized by abnormal falling or prolapse of the stomach and intestines, brought about by relaxation of the abdominal muscles. Among its symptoms are abdominal distention, constipation or diarrhœa, dyspepsia, loss of appetite, headache, emaciation, and sleeplessness. Frequent causes are intestinal autointoxication and tight lacing in women.

Treatment includes the wearing of a bandage, rest in bed, proper diet and exercise, and attention to the general hygiene. In severe cases an operation may be required.

Visconti, a famous Italian family, long prominent in the government of Milan. **ORTONE** (b. 1208), as archbishop of Milan, and head of the Ghibellines, in 1277, defeated and imprisoned the Della Torre family, then in power, and made his nephew, **MATTEO** (b. 1255), imperial vicar of Lombardy. The latter succeeded his uncle in political supremacy in Milan in 1295, and through diplomacy gained control over a large territory. He was excommunicated in 1322, and abdicated in favor of his son, **GALEAZZO I.** (b. 1277), who ruled at Milan for six years. **Azzo** (1302-1399) succeeded Galeazzo I., his father, in 1328; and having bought the title of imperial vicar, extended his dominions by conquest. He was succeeded by his uncle, **LUCCHINO** (1287-1349), a harsh but successful ruler, and a patron of arts and letters. **GIOVANNI**, brother of Lucchino, archbishop of Milan, ruled from 1349 to 1354, and established the power of the Visconti over nearly the whole of Northern Italy. The greatest of the Visconti, **GLIAN GALEAZZO** (c. 1347-1402), did a great deal for art, literature, and science at Milan, Pavia, and Piacenza. When he died (of the plague) he was aspiring to the kingdom of Italy. His daughter **VALENTINA** (d. 1408) married in 1389 Louis, Duke of Orleans; and it was on the strength of this marriage that Louis XII. of France eventually claimed Milan. With Galeazzo's son, **FILIPPO MARIA** (1391-1447), the male line of the Visconti died out. His daughter, **MARIA BIANCA** (d. 1468), married Francesco Sforza. Consult Symonds' *Renaissance in Italy*; Sismondi's *History of the Italian Republic in the Middle Ages* (Eng. trans.).

Viscose. See **Cellulose**.

Viscosity, the property of matter in virtue of which it resists, but at the same time yields under the action of shearing forces. It differs from elasticity inasmuch as it does not imply any power of recovery when the distorting force is removed. Viscosity is specially marked in fluids, and is sometimes called 'fluid friction.' Its effect is to destroy all relative motion in the fluid. The subsidence of waves, the lulling of wind, are examples of the effects of viscosity. Fluids differ greatly in the amount of their viscosity, from extremely mobile liquids such as ethyl ether or water, to highly viscous fluids such as honey, tar, or molasses. In the case of gases and liquids, viscosity is due to the diffusion of molecules between continuous layers which are moving with different speeds. The more energetic molecules of the

more quickly moving layer pass into the more sluggish layer, and increase its momentum. Similarly, the more sluggish molecules move into the more rapid layer, and decrease its momentum.

Viscosity, in fact, is defined as the diffusion of momentum. When a wire is set oscillating either flexurally or torsionally, it gradually loses energy and comes to rest. This loss is due partly to the friction of the air through which it moves, and partly to the viscosity of the solid material itself.

Viscount, a title fourth in rank among the nobility of England, France, Italy, and Spain—between earl and baron. Originally in Great Britain the viscount was a sheriff who acted as deputy for the count or lord-lieutenant of a county. As an honorary title it was first bestowed (1440) by Henry VI. In the Isle of Jersey a viscount is an officer of the crown, like an English coroner.

Viscum. See MISTLETOE.

Vishinsky, Andrei Yanuarevich (1883-1954), Russ. 'hatchet man,' b. Odessa, ed. Baku and Kiev univs. Member Communist Party from 1920. Vice premier 1938-40; del. to U.N. Gen. Assembly and U.N. v.p. 1947-49; for. min. 1949-54.

Vishnu, the second person of the Trimurti, or trinity of Hinduism, is identical with the primeval essence which, before created things, moved on the face of the waters. He was first deified as the sun, whence, on taking his place among the Triad, he is described as the preserver of life. Four of his earliest alleged incarnations—a fish, a tortoise, a boar, and a man-lion—took place at a very remote period of the world's history. In four subsequent incarnations Vishnu took human shape, and is described as visiting the earth to do battle with evil or to avert disaster. It is as Rāma and Krishna, sympathizing personal deities, that Vishnu appeals to the popular hearts and minds of Hindus. The ninth incarnation, Buddha, was without doubt added by Brahman theologians as a sop to weak-kneed Buddhists. A tenth incarnation, Hindus believe is reserved for the last day, when Vishnu is to return to execute righteousness and judgment.

The Vishnuite doctrines were gathered into one body in the 11th century as the *Vishnu-Purana*. Innumerable sects of Vishnuites grew up, Vaishnavas, some of whom are named after reforming teachers, such as the Chaitanyas. Of twenty principal sects and a hundred minor brotherhoods some are merely local, others are wealthy bodies and wide-

spread, and one has developed into a warlike nation, the Jains.

Visible Speech, a method of representing speech sounds by means of signs depicting the shape of the mouth in uttering them. By this method deaf mutes have been taught to read, and difficult words in unknown languages pronounced. The system was first made known in 1867 by A. M. Bell in his work, *Visible Speech*. It was, however, preceded by *Principles of Speech* (1849), containing the germ of the idea. In the training of deaf mutes, however, Bell's alphabet has been largely superseded by other less complicated systems. See DEAF; DEAF MUTES, EDUCATION OF.

Visigoths. See Goths.

Vision. Upon the retina of the human eye rays of light proceeding from external objects are brought to a focus, and produce an image in miniature of the external scene. When the normal eye is at rest, parallel rays of light are brought to a focus on the retina, and all rays of light coming from 20 feet or beyond diverge so little that they may be regarded as parallel. From objects within that range, however, the rays diverge so much that the refractive power of the lens is increased by muscular action in order to bring them to a focus upon the retina. On ordinary optical principles a point above the direct line of vision comes to a focus at a point of the retina below its center and *vice versa*. If the retina could be looked at by another person it would be found that an image of the object is formed on the retina, and that this image is inverted. Any increase in the magnitude of the retinal image is generally associated with approach of the object, and in the exceptional cases in which this result can be brought about by means of lenses, even where the real distance is increased, the object *seems* to approach; this seeming to approach being the result of an unconscious process of reasoning. The mind, on the basis of tactile experience, interprets any given object as being of a known or ascertained size: if it comes to look larger, it is inferred that it has come nearer.

The duration of a stimulus necessary to produce vision is exceedingly short; but once produced, the sensation persists as an after-image for an appreciable time. Singleness of vision with two eyes depends on the association of certain parts of each retina with the other. The ordinary movements of the eyeballs bring the visual axes of the eyes to converge upon an object, so that the two

images fall on corresponding areas. Binocular vision increases the facility with which the size, distance, and solidity of objects may be correctly estimated.

The apparent brightness of an object depends upon the amplitude of the light waves which pass from it to the eye; and the smallest perceptible difference of brightness always bears a nearly constant ratio to the full intensity of the bright objects (Fechner's psycho-physical law). Delicacy and accuracy of vision are most acute on the part of the retina called the 'yellow spot,' hence the greater use of this part of the eye in such acts as reading, in which the eye is moved so as to 'run' the yellow spot along the lines of print from word to word. Discrimination of color is also keenest around the yellow spot, where over two hundred tints may be distinguished.

As between different colors, the eye perceives them with different intensities, even when the physical intensity is the same: thus yellow appears brighter in a bright light than an equally intense red. As light fades away the different colors fade away unequally, so that the ratio in Fechner's law above referred to is different for each color: red and yellow disappear first, blue last; and thus in a dim light the blue is the brightest. Two theories, the Young-Helmholtz and the Hering, have been advanced to account for color sensation and color perception. According to the first, rays of different wave lengths which produce the different colors initiate diverse molecular vibrations around the sensory nerve fibrils, which convey correspondingly varied impressions to the visual centers. According to the Hering theory, different rays produce diverse chemical changes, which in their turn stimulate the nerve fibrils in distinctive fashion.

See EYE; LIGHT; OPTICS; OPTOMETRY; REFLECTION AND REFRACTION. For Defects of Vision, see COLOR BLINDNESS; ASTIGMATISM; MYOPIA; STRABISMUS. Consult works by Wundt, Hering, Helmholtz, and others.

Visions, mental representations of external objects or scenes, as in sleep or trance. Hence the term denotes dreams, phantasies, or apparitions, and specifically, inspired and prophetic revelations. See DREAMING; PSYCHICAL RESEARCH; SPIRITUALISM.

Visitation. The Festival of the Visitation, to commemorate the visit of the Virgin Mary to her cousin Elizabeth, is observed by Roman Catholics on July 2. Visitations are

among the duties of archbishops, bishops, and archdeacons.

Visitation, Order of the. See FRANCIS, St., of Sales.

Vis Major (Latin, 'superior force'), in law, an unavoidable accident, due to natural causes—an act of God. See CARRIER.

Vistula, a river of Central Europe, rises in the Carpathians and flows n., through Poland and thence through Danzig, describing a curve to the e., then another to the w., and after a course of 650 m. enters the Baltic lagoon of the Frisches Haff between Danzig and Königsberg. It becomes navigable at Cracow for small vessels. Its principal tributaries are the San, Vieprz, Bug, and Drewenz.

Vitaceae, also called **Ampelideae**, a natural order of polypetalous plants of which the common vine may be regarded as the type. They possess simple or compound leaves, with or without stipules, the lower leaves opposite, the upper ones alternate; the flower stalks racemose, opposite to the leaves, sometimes (as in the vine), by abortion, changing into tendrils. See GRAPE.

Vital Statistics, tabulations of numerical facts, which include primarily data of births, deaths, and marriages, and the numerous correlations of each of these—as variations of births, deaths, and marriages according to seasons, climatic and geographical conditions, race, religion, occupation, density of population, and prices of food; variations of births according to sex, the ages of parents, hour of the day, legitimacy, and residence in city or country; variations of deaths according to age, conjugal condition, and diseases; and variations of marriages according to age and previous conjugal condition. Of fundamental importance are complete and accurate registrations of births, deaths, and marriages, with a statement of the age, sex, conjugal condition, occupation and cause of death.

The historical development of vital statistics may be said to have begun with the Domesday Book of William the Conqueror (1086). In 1592 deaths began to be recorded in London. In 1662 Captain John Graunt, F.R.S., issued *Natural and Political Annotations upon the Bills of Mortality*. Graunt studied the proportion of the sexes in the total population; the ratio of the sexes at birth; the ratio of births to deaths in city and in country; the constancy in the proportion of deaths due to various causes 'to the whole number of burials'; and the propor-

tion of persons dying at various ages. Graunt's work was soon followed by that of Petty, Gregory, King, and Arbuthnot, and in 1693 appeared Edmund Halley's work, *An Estimate of the Degrees of Mortality of Mankind*, giving a table of mortality calculated on the assumption of a stationary population, the foundation of scientific life insurance.

The next great advance was made by the masterly work of Johann Peter Süssmilch, *Die Göttliche Ordnung, or The Divine Order in the Variations of the Human Sex*, appearing in 1741. Süssmilch found an equality in the numbers of the sexes at the age of marriage; a ratio of 21 male to 20 female births; a ratio of 13 births to 10 deaths; and regularity in the number of deaths each year with respect both to sex and to age. The work was carried on by Kerseboom in Holland, Deparcieux in France, and Wargentin in Sweden.

Recent years have seen a great increase in statistical material, and a substitution of numerical registration for the loose estimates from averages of earlier times. Registration statistics of births, deaths, marriages, and divorces are now collected more or less systematically in most European countries, including Germany, France, Austria, Hungary, Italy, and Spain, as well as throughout the British Empire and in a large part of the United States.

The death rate of the U. S. in 1938, published by the Bureau of the Census, was 10.6 per 1,000 p.; Australia, 8.6; New Zealand, 8.6; England and Wales, 11.4; Japan, 18.2; Chile, 24.7. The leading causes of death in the U. S., are heart disease, cancer, apoplexy, pneumonia, Bright's disease, tuberculosis, and influenza. The birth rate in the U. S. in 1938, per 1,000 p., was 17.6. In 1938, New Mexico with 33.9 had the highest birth rate. In 1939, N. Y. C. had a birth rate of 13.5 per 1,000 population and a death rate of 10 per 1,000. In 1951, the birth rate of the U. S. was 24.5; the death rate, 9.7 per 1,000.

Vitamins, Vitamines, or Accessory Food Factors, certain organic substances of unknown constitution which are necessary for the proper nourishment of the body, and the absence of which from the diet causes certain characteristic diseases as beriberi, pellagra, and scurvy. Thus, a restricted diet of polished rice produces beriberi, a peculiar condition characterized by the symptoms of a peripheral neuritis and muscular degeneration, while a diet of unpolished rice

—i.e., rice from which the bran coats have not been removed—gives rise to no such untoward effects. Similarly, a long-continued diet containing no fresh meats and vegetables causes scurvy, while the addition of fresh foods, especially milk and lemon juice, will restore normal conditions. It is, therefore, apparent that the bran coats of rice contain an essential food element that is absent from the rest of the kernel, and that fresh fruits and meats contain an important principle not occurring in the dried products.

Little is definitely known of these essential substances—first termed vitamins by Dr. Casimir Funk in 1912—largely because of the difficulty of isolating them in sufficient quantities for study, but continued research has had good results and added to our knowledge concerning them. Two groups are now recognized comprising fat-soluble vitamins A, D., and E. and water-soluble vitamins B₁, B₂, and C.

Vitamin A is found in leafy plants, in fruits, and in the various organs of animals, such as the heart, liver, kidney and brains of beef animals, the liver of codfish, in cheddar, cream cheese, eggs and milk. It acts as an anti-infective agency only when part of an adequate diet, therefore its excessive use will not reduce frequency of colds.

Vitamin D, known as the antirachitic vitamin, is found in fish-liver oils and the body fat of some fishes. Small amounts are present in milk and butter, and possibly fruit. Vitamin D can be supplied as a constituent of the diet, or as a result of irradiation, which converts ergosterol present in the ergot of rye and yeast into vitamin D.

Vitamin E, the anti-sterility vitamin, is found in wheat germ, lettuce and fruits and, to a lesser extent, in egg-yolk and milk.

Vitamin B₁, the antineuritic vitamin, occurs in fresh vegetables, liver, eggs, milk and wheat germ. It is a cure for beriberi in man and for polyneuritis in birds.

Vitamin B₂ (also vitamin G), the antipel-lagic vitamin, occurs in lean meat, yeast, and to some extent in legumes and fruits.

Vitamin C, the antiscorbutic vitamin, finds its richest source in green leaves, citrus fruit juices, turnips and tomatoes. Recent investigations prove that a diet poor in vitamin C is likely to result in dental disorders.

Two vitamins discovered recently by English scientists are Vitamin P-P or Niacin, which is found in milk, lettuce, liver and wheat embryo, and the other, for which the name vitamin B₃ is suggested, found in yeast and

chemically different from vitamin B₁ and vitamin B₂.

Still other identified vitamins are vitamin K, called the anti-hemorrhagic vitamin; vitamin B₆, or pyridoxin; and pantothenic acid (the 'gray-hair' vitamin), also of the B complex group.

The exact manner in which the vitamins act is still a matter requiring a great deal of study and research, but in their effect and in the apparent need for an unfailing supply of them for proper bodily growth and nourishment, they present an analogy to the hormones, such as adrenalin, which are useful in regulating the body functions. Vitamin E was discovered by Dr. Herbert MacLean Evans of California. In 1935 he succeeded in isolating it, in the form of a white crystalline powder, from cotton seed and wheat germ. In 1936 Dr. McCollum of Johns Hopkins University reported that Vitamin A, of which he was one of the discoverers, is not a specific cold preventive, though it aids greatly in the physical growth of children and has proved of considerable help in preventing eye-disease.

Consult Williams' *Biochemistry of B Vitamins* (1950); Harrows' *C. Funk, Pioneer in Vitamins & Hormones* (1955); Harris' *Vitamins in Theory & Practice* (1955). See also DIET AND DIETETICS.

Vitebsk, town in the Republic of White Russia, U.S.S.R., on the West Dwina River; 80 m. n.w. of Smolensk. It has the Cathedral of St. Nicholas (1664) and the Church of St. Elias (1643, a fine example of Old Russian style). It has a trade with Riga in grain, flax, sugar, and timber as well as dye works, large tanneries, and manufactures of candies, vinegar, mineral waters, tobacco, needles and spectacles; p. 102,400.

Vitellius Aulus (15-69 A.D.), emperor of Rome 69 A.D. He was consul in 48 A.D. Galba gave him the command of the troops in Lower Germany in 68 A.D. and by his great familiarity and liberality towards them he soon won their allegiance. Aided by this fact he was persuaded by Fabius Valens to aspire to the throne, and Valens and Caecina defeated his rival Otho, at the first battle of Bedriacum (April, 69). Vitellius reached Rome in July; but at the same time Vespasian was proclaimed emperor in the East. In October Vespasian's troops defeated the Vitellians in the second battle of Bedriacum, and marching on Rome, killed Vitellius.

Viterbo, city, Italy, in province of Rome; 50 m. n.w. of Rome. The cathedral is Ro-

manesque Gothic. Viterbo was frequently a papal residence. It has manufactures of paper, soap, leather, and matches; p. 20,000

Vitis, a genus of woody vines (*Vitaceae*) which includes the grape. Several species have been developed into the many varieties now cultivated, chiefly for dessert fruit. Among the largest-fruited wild kinds are the Southern muscardine (*Vitis rotundifolia*) and the Northern Fox or Plum grape (*V. Labrusca*) which is the parent of many cultivated forms (notably of the valuable blue-black Concord).

Widely distributed wild grapes are the Riverside (*V. vulpina*), with bluish-black berries, and a bloom, fruiting in late summer; the sour, black Summer Grape (*V. aestivalis*), and the Winter Grape (*V. bicolor*), which holds its numerous compact clusters of tiny acid fruit, dark blue, grayed with a bloom, until late fall. The Frost Grape (*V. cordifolia*), also known as 'Chicken' or 'Possum grape, likewise ripens its fruit late.

Vitoria, or **Vittoria**, capital of the Basque province of Alava, Spain; 31 m. s.e. of Bilbao. It has manufactures of mirrors, paper, carriages, hardware, and picture frames. The cathedral dates from the 12th century. On June 21, 1813, Wellington defeated here the French under Joseph Bonaparte and Jourdain; p. 37,017.

Vitreous Rocks. That division of the igneous rocks which are like molten glass in texture. The commonest examples are the obsidians and the pitchstones, the latter being somewhat crystallized, with a texture between glass and stone. See OBSIDIAN; PITCHSTONE.

Vitriol (derived from the Latin *vitrum*, 'glass') is a term which the early chemists applied to glass-like salts, distinguishing them by their colors into blue vitriol (copper sulphate), green vitriol (iron sulphate), and white vitriol (zinc sulphate). For *Oil of Vitriol*, see SULPHURIC ACID.

Vittorio, episcopal town, Italy; 40 m. n. of Venice. It has mineral springs, silk mills, and manufactures of cement; p. 29,000.

Vittorio Emanuele. See **Victor Emanuel**.

Vitus, St., a Roman martyr who suffered under Diocletian. His day is June 15. His influence is besought against such diseases as St. Vitus' dance (see CHOREA), sudden death, and hydrophobia. He is also the patron of comedians and dancers.

Vivandière, in the French and some other Continental armies, a female attendant

in a regiment who sells spirits and other comforts, ministers to the sick, and marches with the corps. From the Algerian campaigns the vivandière wore a modified (short-petticoated) form of the regimental uniform; but this arrangement is now forbidden by government. The vivandière has been largely superseded by the *Cantinier*.

Viviani, René (1863-1925), French statesman, born in Side Bel Abbès, French North Africa. Having early allied himself with the Socialist movement, he was elected to the French Chamber of Deputies in 1893 as member from the Sorbonne quarter of Paris, a position which he retained until 1902. In 1906 he was made Minister of Labor in the Clémenceau Cabinet, continuing in that office under the Briand Ministry until 1910. In 1913-14 he was Minister of Public Instruction in the Doumergue administration. In June, 1914, he was called to the Premiership, serving in that office during the first year of the World War I. He resigned in October, 1915, and became Minister of Justice in the succeeding Briand Ministry; and in the War Ministry appointed by Premier Briand on Dec. 12, 1916, he received the portfolio of Justice and Public Instruction. He visited the United States in 1917 and was delegate to the Disarmament Conference in Washington in 1921. He was appointed French delegate to the first meeting of the League of Nations in 1920.

Vivianite, a mineral hydrous ferrous phosphate existing as prismatic crystals, often in stellate groups, also reniform and globular, and as an incrustation. It is colorless and transparent when unaltered, but is often found of bluish to greenish color, and opaque. Its principal localities are Greenland, England, Transylvania, Canada, Kentucky, New Jersey, and Virginia.

Vivisection, or the dissection of the living subject, was practiced upon human beings by Herophilus (300 B.C.), and as recently as 1570 criminals were vivisected at Pisa. Vivisection now implies the performance of an operative experiment upon a living animal for the purpose of advancing biological science, and is better described as 'animal experimentation.'

In Great Britain experiments which inflict pain upon animals may be undertaken only by those teachers and investigators who have obtained a government license. A Royal Commission of Vivisection, appointed in 1906, after six years' study of the subject

reported that not only in consequence of animal experimentation had disease been successfully prevented and its mortality reduced, but that suffering had been diminished in man and lower animals. The Commission also believed that similar methods of investigation would be attended with similar results.

In the United States anesthetics are regularly used during all cutting operations and experiments otherwise involving pain. When the end sought is obtained during the operation, the animal is destroyed while unconscious. Anti-vivisectionists in New York have endeavored to secure legislation controlling such experiments; but both the common law and the statute law in New York govern the practice of animal experimentation, and in the opinion of Dr. G. W. Kirchwey, 'The present law is an adequate safeguard against abuses in animal experimentation.'

Among the diseases which have been rendered amenable to treatment or to prevention by experiments on animals are diphtheria, cerebro-spinal meningitis, syphilis, dysentery, tetanus, malaria, diabetes, and tuberculosis. The most recent information concerning the communicability and methods of prevention of infantile paralysis is derived entirely from the results of experiments on animals. Much of our knowledge of physiology, of the effect of medicines, and of bacteriology has been obtained by these means, and human pain has been relieved and human life has been saved in countless instances through the knowledge obtained through vivisection. Cushing writes that except by means of animal experiment there has been no soporific introduced in the last forty years, no local anesthetic discovered, and no modern antipyretic made known. The study of cancer has long been barren because the method by animal experimentation was not thought applicable. Very many surgical operations that save life have been made possible and successful only through similar knowledge. President Eliot of Harvard University, in opposing the enactment of a specific law restricting vivisection in Massachusetts, said: 'The humanity which would prevent human suffering is a deeper and truer humanity than the humanity which would save pain or death to animals.'

For a favorable exposition of the subject, consult W. W. Keen's *Animal Experimentation and Medical Progress* (1914). The views of the opponents of vivisection may be

found in Albert Leffingwell's *The Vivisection Question*, issued by the Vivisection Reform Society (1907).

Vizetelly, Francis Horace (Frank) (1864-1938), author, radiologist, and editor, b. in London, England. He engaged in the publishing business with his father and brother, forming the London firm of Vizetelly & Co. In 1891 he went to New York, becoming assistant editor, associate editor, and managing editor (1891-1916) of the *Standard Dictionary*. He was secretary of the Editorial Board of the *Jewish Encyclopedia* (1899-1903); associate editor on the Schaff-Herzog *Encyclopedia of Religious Knowledge*, the *Encyclopedia of Social Reform*, and others. He was the editor of *The Lexicographer's Easy Chair of the Literary Digest*. He wrote: *The Development of the Dictionary of the English Language* (1915); *Essentials of English Speech and Literature* (1915); *A Dictionary of Simplified Spelling* (1915); *A Desk Book of 25,000 Words Frequently Mispronounced* (1917); *2,000 Simple Words Everyone Should Know* (1923); *Our Color Box of Speech* (1933), etc.

Vizetelly, Henry (1820-94), English illustrated press pioneer, was born in London. He successfully started the *Pictorial Times* (1843) and *Illustrated Times* (1855). In 1852 he published the first edition in England of *Uncle Tom's Cabin*, and also introduced the works of Longfellow and Poe into that country. He was correspondent of the *Illustrated London News* during the Siege of Paris, and published *Paris in Peril* (1882). He was the author of *The Man with the Iron Mask* (1870); *Berlin under the New Empire* (1879); an edition of *Memoirs of Grammont* (1889); *Glances Back Through Seventy Years* (1893), etc.

Vizier, the title of the chief political officer of the early califs (750); adopted (1328) by the Ottomans, and assigned to the highest official at the Mogul court of Delhi and in other Mohammedan states. In 1878 the title of *grand vizier* was abolished, that of president of the council of ministers being substituted.

Vladimir, or **Wladimir**, Central Russia, lying between Nijni-Novgorod on the e. and Moscow on the w, now in the Ivanovo Industrial Area in the U.S.F.S.R. The surface is a rolling plain, which belongs entirely to the Volga basin, mainly through the Oka and Klyazma. Lakes and extensive marshes are numerous. The chief mineral deposits are

alabaster, limonite, and porcelain clay. The soil is for the most part sandy, stony, and clayey. The crops are rye, oats, millet, barley, potatoes, and flax. Fruit culture is very flourishing. Industrially, Vladimir is the third government in Russia (coming after Moscow and Petrograd). The industries are concerned chiefly with the working of cotton, flax, cloth, silk, glass, pottery, crystal, metals (especially copper and iron), chemical products, timber, hides, icon painting, house painting, the manufacture of carts and carriages, gloves and stockings, beer and spirits, matches, and fur garments. Of the population, more than 95 per cent. are Great Russian and Orthodox. Area, 18,864 sq. m.; p. 1,900,000. Capital, Vladimir; p. 37,000.

Vladivostok, or **Wladiwostok**, city, capital of the Far Eastern Region, an autonomous area of the Russia Soviet Federated Socialist Republic, the largest of the Republics of the U.S.S.R., is situated on the eastern shore of the Gulf of Amur. It has a spacious, well-equipped harbor, formed by the Bay of the Golden Horn, ice free for nine months in the year, and rendered accessible by ice breakers during the remaining months. Communication with European Russia is furnished by the Siberian Railway, of which Vladivostok is the eastern terminus. The climate is severe, the mean temperature for January being 6° F., and for August 70°.

Vladivostok is well built, with paved streets and modern business structures. There are Roman and Greek Catholic cathedrals, a Lutheran church, an Oriental institute for the study of Eastern Asiatic languages, and several professional schools. Its fine harbor and railway facilities, together with the development of an agricultural population in the surrounding country, have made it a city of considerable commercial importance.

The town was founded in 1860 and made a free port in 1865, remaining so until 1909. During the First World War (1914-18), when the Baltic ports were closed, vast quantities of military and other supplies entered Russia by way of Vladivostok and the Siberian Railway; p. 206,432, including Russian, Chinese, Japanese, and Koreans.

V-Mail for soldiers in World War II consists in letters written on special paper and photographed on micro-film. Such letters effect a great economy in transportation.

Vocational Education. The general aim of that type of education known as vocational education is the preparation for, and trade improvement in, specific industrial,

commercial, agricultural, and home-making employments. The groups intended to be reached by this type of training are those who are either definitely headed for or are already engaged in the usual wage-earning occupations.

Although the term vocational education may literally be used to cover the whole range of vocational preparation, from the short, intensive, and partial trade-instruction course to that of professional and technical training, common usage has given it the more narrow meaning of industrial, and even that of trade training.

The U. S. Federal Vocational Education act, effective July 1, 1917, which provided for Federal grants to the States in aid of vocational education, has resulted in the establishment in each State of the United States of a board to administer the provisions of the act, and in a most amazing growth of schools and departments devoted to its particular curricula. In 1933 the total enrollment in the U. S., in vocational classes receiving Federal aid, was 1,031,571. It has helped to fix the conception of publicly supported vocational training as a system whereby prospective or actual wage-earning groups may receive specific instruction in some employment, through special material and arrangements appropriate to the specific purposes in view.

In terms, then, of the chief problems which vocational education faces we have: (1) The specific groups to be reached by this type of education; (2) the specially organized teaching material typical of vocational instruction; (3) the special teaching personnel and its equipment; (4) the definite relations between such vocational education and the employments for which it trains.

While variations of this conception may be found in practice, it is safe to say that any approved plan of vocational education usually is established with the view of meeting the four problems above mentioned. As regards Federal aid for vocational training, the terms of the law require that these four elements or problems be met in accordance with the stipulations of the Federal Act.

Vocational education as we know it to-day, although defined, organized, and administered with a clearness of purpose such as has not in a large way been previously known in this country, is the outgrowth of several distinct influences. The present development and the established position of vocational education in the field of public instruction

are due in the first place to the realistic scrutiny in late years of the results achieved by the prevailing school systems. Particularly the studies of why children leave school for work, follow-up work, and studies of the after-school careers of children have brought about a realization of the gap which exists between school and life. The social interest in the child, therefore, coupled with the American view of education as preparation for democratic activities has furnished the broad general incentive for the vocational education movement.

More concretely, however, the following factors have counted:

1. The separation of the average school child, particularly in town and city schools, from any active participation in the informing industrial activities and in the handwork and physical occupations of the farm and rural home. The factory era has taken out of the home and immediate neighborhood of the child those activities which in previous generations served to give many a boy and girl a useful kind of industrial initiation.

2. A revival of interest in the value of a thorough-going apprenticeship system such as flourished in the Middle Ages. While there has been a tendency to idealize that system and overlook some features in it which this age would not tolerate, nevertheless the contrast between that system, which was based on the sound assumption that industry must carry its responsibilities for the efficient preparation of its workers, and the modern indifference on the part of industry to these responsibilities has led the more enlightened employers and progressive educators to attempt a restoration, in a measure, at least, of what was permanently valuable in the old system.

3. From the side of the schools, criticisms of their bookishness, and a desire to connect and illuminate school work with the educational values in the economic world, which have led to the establishment of notable pioneering efforts in the direction of industrial training. Beginning with the simpler forms of manual training, which, though little related to the concrete experiences which genuine productive work contains, nevertheless possesses useful elements of its own, the growth has been toward the more specialized industrial courses we are familiar with to-day.

4. The example of other countries, notably Germany, which has shown how extensive may be made the connection between the

schools and the occupations of the community.

5. Finally, the requirements of modern industry, which, broadly speaking, have necessitated both public and private effort to equip the worker not only for satisfactory employment, but for progressive development within his particular occupation.

All these elements have had their part in furthering the vocational education movement. Each has been advocated with more or less bias and with more or less vision, but each has made a contribution of lasting importance to the proper growth of the movement.

The task of the coming years will be not only to make vocational education effective, but also to attach to it those broadly cultural and civic elements which the exponents of general education rightly believe to be basic to all education. The work of reconciling the needs of industry with the ideals of a democratic education is the task of the present stage of progress in the movement.

Vocational education specifically aims to reach two distinct groups. First, those who are working in trade, commercial, agricultural, and homemaking occupations. Second, those who are still in school and are preparing to find employment in these occupations. The employed group represents a large percentage of the working population who quit school for work after the 14th year, or as soon as the law permits. The needs of these insufficiently-schooled and industrially-unprepared workers are the foremost problem for vocational education, and its principal concern. To serve this large majority, the various vocational enterprises here discussed have been undertaken. As regards the second group, those still in school, the problem is one for both the general educational system and the vocational counselor and teacher.

Vocational courses and schools are distinguished from other types of educational institutions: 1, by their specific interest in a particular type of training intended to be of service in a particular calling or environment; 2, by the organization of the technical knowledge of practical use in the calling or environment; 3, by the provision of organized experience with the manual operations that are usual to such calling—this is known as training in manipulative skill, and is intended to fix standards of best practice in given jobs; 4, by the industrial intelligence program which aims to furnish the student

or worker with a background, and an adaptability that makes for a more progressive adjustment to the changes that may take place in the occupation.

It will be readily seen that the effectiveness of vocational education depends on the solidity of its contact with the fields for which it trains; consequently the aim, equipment, methods of instruction, and the very atmosphere of the course all are decisive elements. If the tendency of vocational instruction be to specialize narrowly, the point should be remembered that it does so in response to the specializations of demand that occur in the industrial field. General education does not have to be guided by these specializations. Vocational education fails if it does not. In other words the keynote of this type of training is productive service in a given calling.

Experience with modern types of vocational training has fixed the following elements as basic to the plan:

(1) Careful selection of pupils for the vocational course so as not to admit the physically or otherwise unfit; (2) at least a two years' apprenticeship or pre-vocational course leading up to the more specific industrial course, which should not begin below the 16th year; (3) a division of time—50 per cent. on actual shop work, 35 per cent. for studies closely related to such work, and 15 per cent. on general or academic instruction; (4) a placement service. The vocational school is especially obligated to conduct an employment bureau for its pupils. The follow-up work, that is, the continued supervision of pupils trained and placed, enables the school to check up the effectiveness of its work.

There are three recognized types of vocational training.

1. Full industrial training, the aim of which is to turn out skilled journeymen or technical specialists capable of earning the current wages of their craft. All-day schools or a long period of evening attendance are required for this type of training.

2. Special industrial schools or courses, which aim to shorten the preparatory or apprenticeship period by giving intensive instruction in one or more elements of a trade and by laying foundations for industrial skill and intelligence which shop experience will develop.

3. Trade improvement courses, which supplement the vocational experience of those at work in wage-earning occupations.

As regards these last two types, various time-adjustments are made, such as alternate days or weeks for school attendance, dull season terms, late afternoon or evening sessions. Such schools are maintained by public funds, private endowment, tuition fees, by contributions of employers or other private groups, or by joint public and private support.

Within these classifications of schools, time arrangements and sources of support, occur a large variety of vocational education undertakings. Though the tendency to standardize all such instruction is strong, the very nature of vocational education implies an experimental attitude and a ready flexibility with regard to meeting the specific needs of the pupils and the ascertained requirements of the occupations.

United States: Federal and State Vocational Education.—The Federal Vocational Education Act provides for co-operation between the Federal Government and the several States individually through the acceptance of the Federal act by the State legislature. Through legislative enactment or the governor's action every State in the Union was qualified to participate in the benefits of the Federal funds for the fiscal year ended June 30, 1918.

The Federal law provides that State legislation shall specifically cover three points: 1. The acceptance of the provisions of the Federal act; 2. the creation or designation of a State board to administer the act; 3. the appointment of the State treasurer as custodian of Federal funds. These three points are now covered by the legislation in each of the States. Included in the jurisdiction of State Boards for Vocational Education are agricultural, trade and industrial, and home economics education, and, since 1920, vocational rehabilitation of disabled civilians.

The Federal Board of Vocational Education has from the beginning of its administration advocated some form of part-time education which would meet some of the educational needs of minors who have left the regular public schools and have entered upon employment. Section 11 of the Federal act provides that at least one-third of the money apportioned to a State for the salaries of teachers of trade, home economics, and industrial subjects must be expended, if at all, for part-time schools and classes, and the act further provides that the subjects in a part-time school or class may be subjects given to enlarge the civic or vocational in-

telligence of persons over fourteen years of age who have entered upon employment. This includes general continuation school work as well as trade extension and trade preparatory work.

Prior to the enactment of the Federal vocational education act two of the States had provided for compulsory school attendance of minors over fourteen years of age. The law in Wisconsin was enacted in 1911 and originally provided for the attendance of children fourteen to sixteen years of age for four hours a week. In the sessions of the legislature subsequent to 1911 changes had been made so that, with the final amendments in 1917, employed children were required to attend part-time schools between the ages of fourteen and seventeen for not less than eight hours a week.

The Pennsylvania law, enacted in 1913, provides for the attendance of minors fourteen to sixteen years of age for not less than eight hours a week. Sixteen other States, at the 1919 sessions of the legislature, passed compulsory part-time laws providing for the attendance upon part-time schools or classes of employed minors. Eighteen States now have some form of compulsory, part-time school legislation, sixteen of them having passed such laws during the 1919 session of the legislatures.

Agricultural Education.—Development in the field of vocational agricultural instruction of less than college grade has been in the direction of the establishment of departments of agriculture in high schools or in the establishment of rural vocational schools. Few of these schools or departments employ more than one teacher of agriculture. The pupils for the most part live at home on farms. The supervised practical work is usually in the form of home projects. The States are rapidly setting up State and local systems of supervision of this project work which look toward a better co-ordination of the schoolroom instruction with the project work. These departments are in the nature of part-time schools of the occupational extension type, the instruction being designed to supplement the employment of the pupil on the home farm.

Many of the colleges of agriculture have already made provision for the recognition of high-school agriculture for entrance credit. There is also a tendency on the part of the agricultural colleges so to organize the instruction of the first and second years of the regular college course as to permit the gradu-

ate of a vocational department of agriculture in the high school to elect advanced courses rather than to take the elementary courses which repeat much of the instruction which he has received in high school.

The U. S. Department of Agriculture, in co-operation with the land-grant colleges, has organized an agricultural extension system which extends throughout the United States. This has been done in accordance with a series of acts of Congress authorizing the establishment of such work and making appropriations therefor. This extension work consists of practical demonstrations, and the dissemination of information among men, women, and children through the personal work of county agents, home demonstration agents, boys' and girls' club workers, and others. This work covers the various branches of agriculture and home economics, including marketing and rural organization. It is supplemented by the widespread distribution of publications of the U. S. Department of Agriculture, the experiment stations, the agricultural colleges and State departments of agriculture.

Home Economics.—According to the Federal Board the aim underlying the development of vocational home-economics education is to reach all groups of girls and women with a type of home-making training which will function immediately in the solution of the daily problems of home making. Most of the home-economics work offered by the public schools has been given as a part of the grade or high school program mainly to those girls who are in school. Much of this instruction is good and has an important place, as a part of the general education of a girl. The aim of a vocational home-economics education differs from this in that it is not planned so much to impart general useful information as to train a girl for the specific occupation of home making.

The first and governing motive underlying all vocational home-economics education is to train women to make a home and to practice therein all the activities of the home maker in the most economical, practical, and efficient manner. Its scope is broader than that of general home-economics education in that it proposes to reach all groups of girls and women, whether they be attending high schools, engaged in industry, following the vocation of home making in their own or other homes, or preparing to enter that vocation. Because of this difference of aim and scope, certain demands are made upon any

system of vocational home-economics education which are not made upon general home-economics courses. Vocational courses must be of varying lengths to meet the varying needs of all the different groups of girls and women. Equipment, method, and subject matter must be worked out to cover all the essential phases of the home maker's job.

In 1938 and 1939 vocational education continued to expand, stimulated by the Federal grants under the George-Dean Act. Many new buildings were constructed to take care of increased enrollment. Much effort was being expended in developing a program of instruction in distributive occupations.

The three types of vocational home-economics schools developed in the States have grown out of the needs of the following groups of girls and women: (1) older women who have left school but who can be reached by evening classes; (2) girls who have left school but who come back for part-time classes; (3) girls who are in school. To meet the needs of these groups three kinds of schools have been established: Evening, part-time, and all-day schools. In the past, most of the home-economics training has been offered to the group of girls who are in school, but the number of part-time and evening schools which were aided from Federal funds in 1918-19 indicates the recognition of the needs of those groups which are not reached through high-school courses.

In trade and industrial education the greatest increase has been in the number of part-time and evening schools. Instead of focusing the vocational program upon an all-day school which is intended to prepare young workers for entrance into a given occupation, the States are now beginning to direct the program toward the trade-extension type of class in which the aim is to improve the manipulative skill and technical education of those already employed in a given occupation. Increasing numbers of such classes are being organized in smaller communities having a dominant industry, such as textile work, paper and pulp manufacturing, and mining.

The part-time school is being rapidly developed as a result of the enactment of compulsory part-time school laws. These schools are designed to enable the young worker to secure preparation for entrance into a more desirable occupation, training for promotion in the occupation in which he is employed, or advancement in general education, particularly in civic or vocational intelligence.

Apprenticeship and Corporation Schools.—

Very significant for industry is the wide inauguration of apprentice schools in shops. In Beverly, Mass., the apprentices of the United Shoe Machinery Co. alternate, in two groups of twenty-five each, between the Beverly (public) industrial school and the shop. The boys are paid half the regular piece price for their work, and the company assumes the cost of the shop. In Fitchburg, Mass., apprentices of mechanical trades are given one full year in the high school, followed by three years of alternate weeks in the shops of manufacturers as apprentices and in school. In Cincinnati, Ohio, apprentices are taught, in an improvement or continuation school of the city for four hours a week and forty-eight weeks in the year. 'The school teaches the three R's, civics, mechanical drawing, blueprint reading, and good citizenship. Much attention is given to shop mathematics.' A well-known part-time system applied to engineering education is the co-operative plan between the University of Cincinnati and the manufacturers of that city, by which engineering students who are accepted by the manufacturers enroll also in the university, and are regularly indentured for a six-year course, in which shop and school are closely co-ordinated. During college term they spend alternate weeks in school and shop, and when college is closed they work regularly in the shops. They are paid for their work in the shops at rates which total about \$2,000 for the six years. Though spending only half the time at the university that is spent by those taking the regular four-year engineering course, the apprentice students did three-quarters of the work done by the latter, with grades 25 per cent. better.

The New York Trade School, founded in 1880, was first in offering short trade courses in the building trades, taking day students about four months for completion. The Baron de Hirsch School, also in New York City, and founded in 1891 for Hebrews, offers short day courses of five and one-half months, leading to the position of helper. In San Francisco, the Wilmerding School of Industrial Art for Boys, established in 1900, offers four-year courses in the building trades, with the practical side to the fore and occupying the entire last two years.

State Schools.—In very recent years States and cities have taken up the establishment of trade schools and founded the following: State trade schools, at New Britain and

Bridgeport, Conn.; the Worcester Trade School, Worcester, Mass.; the Wisconsin State Mining Trade School, at Platteville, Wis.; Saunders' School of Trades, Yonkers, N. Y.; the Portland School of Trades, Portland, Ore.; the Philadelphia Trades School; the Columbus Trades School, Columbus, Ohio; the Milwaukee School of Trade for Boys; the Girls' Trade School, of Boston, Mass.; the New York Trade School for Girls, Syracuse, N. Y.; and the Milwaukee School of Trades for Girls.

Vocational high schools aim to keep their academic standards as high as those in other schools. They are intended for the higher and more technical branches of the industrial occupations. In a number of such schools two-year courses are provided for those who cannot compass a four-year program of school attendance. Good examples of such schools are the Boston High School of Commerce for boys, and the High School of Practical Arts for Girls; the Stuyvesant High School of New York City; the Technical High School of Cleveland; and the Lake Technical High School of Chicago.

The Stuyvesant High School provides two courses of instruction:

(a) The General Course for those boys who wish to proceed directly to the Universities in the Schools of Law, Medicine, Dentistry, Engineering, or the purely Academic Schools. In this general course the usual academic subjects are included, with free and mechanical drawing in the first two years, and mechanical drawing in the third and fourth years. Joinery is included in the first year's course; wood turning, pattern making, moulding, and sheet metal work in the second year; forging in the third year and machine-shop construction in the fourth year.

(b) The Industrial Course for those boys who intend to proceed directly from the school to employment in machine shops, in building construction, electric light and power works, in the chemical departments of manufacturing establishments, in commercial industries requiring technical knowledge and skill, or in departments of municipal government. In this course the purely academic work is somewhat restricted. In the first year the subjects included are English, Algebra, Free and Mechanical Drawing, Joinery and Cabinet Making, Music and Physical Training. In the second year, English, Plane Geometry, Chemistry, Free and Mechanical

Drawing, Wood Turning, Pattern Making and Joinery, and Physical Training are included. In the third year English, Plane Geometry and Trigonometry, Physics, Modern History, Mechanical and Architectural Drawing, Forging and Machine-Shop Practice, and Physical Training. In these three years there are no electives. In the fourth year the course includes English, Shop Mathematics, American History and Civics, Chemistry, or Economics, or Industrial and Commercial Law, or Applied Mechanics, Steam, and Electricity; Mechanical and Architectural Drawing and special practical shop-work in one of the following: (a) building construction, carpentry, sanitation, including heating installation, electric wiring and installation; (b) advanced forging and tool making; (c) advanced pattern making and foundry practice; (d) advanced machine-shop practice; (e) industrial chemistry.

Teacher Training.—The importance of adequate plans for training instructors for both shop and related subjects can not be overestimated. The experience of all vocational education projects has shown that the important thing to be considered in an instructor-training program is the qualifications of the instructor-trainer responsible for the selection of candidates to receive training and responsible for the content of the training courses. These qualifications require not only a good working knowledge of practical professional education, but also an intimate knowledge of some one industrial occupation. It is not necessary for the instructor-trainer to be skilled in all of the occupations for which men and women are being trained as instructors, but it is important that he or she should have gained, through experience in industry, an appreciation of industrial conditions. In the year 1933 the States and communities spent \$2.90 for each dollar received from the Federal government.

Vocational Education in Europe.—Germany.—There are in Germany two classes of industrial schools, one to supplement shop work during apprenticeship, and the other to perform the same service after the apprenticeship has been completed. Boys enter upon their apprenticeship at fourteen years of age. The work of the 'continuation school' is generally done in the evening, but the general tendency now is to substitute work in the daytime for that previously taken in the evening. Attendance at these schools is compulsory, and the responsibility

of the boys' attendance is thrown upon the employer. The purpose of the schools is officially (1) to supplement the general education gathered in the common schools with such practical knowledge as will be of value in winning a livelihood; (2) to cultivate the sense of religion, morality, and patriotism.

With respect to grades, vocational education of Germany is classified as higher, middle, and lower. In the class termed higher are universities with their professional departments; technical high schools; and commercial high schools. Of the middle technical schools there is a great variety, some of which are: Agriculture, Art Industries, Building and Engineering Trades, Ceramic Industries, Commerce, Forestry, Metal Industries, Mining and Metal (Prussia), Naval Architecture and Engineering, Navigation, Ship Engineers, Textile Industries, Woodworking Industries. The aim of all these middle schools is to train experts, foremen, superintendents, owners, and managers.

Below the middle schools are the lower schools, designed to train apprentices and artisans, and to extend the technical knowledge and skill of journeymen and master workmen. The total number of such schools, excluding continuation schools for young women, is about 25,000.

In Germany such schools are called *Fortbildungsschule*, which term has generally been translated continuation school or improvement school. An Imperial Law affecting all parts of Germany forbids the employment of children under seventeen in factories and workshops. A similar law decrees that masters in any branch of industry are bound to allow their workers under eighteen to attend an officially recognized continuation school for the time fixed as necessary by the local authorities. By the same law the Local Council is empowered to make attendance at a continuation school compulsory for all male workers under eighteen. In South Germany there is no city or town, however small, without one such school, at least for boys. In Northern Germany, Essen is the only larger town in which such a school is wanting. In Bavaria, Württemberg, Saxony, Baden, and Hesse, attendance at a continuation school is compulsory for all youths up to the age of sixteen, seventeen, or eighteen.

The continuation schools are day, evening, or Sunday schools. They are not subject to uniform regulation, but when a community has established a school of this kind, the central government is asked for a subsidy,

which is rarely denied. Industrial schools of secondary grade are all day and evening schools and are located chiefly in centers of industry.

Munich supplies a complete system of vocational training. The origin of the continuation schools in Munich dates back to 1875, when two of them were founded, one for apprentices and one for journeymen. The former was made compulsory for boys between thirteen and sixteen, and gave from five to eight hours of instruction per week. No regard was paid to the pupil's trade. The school was open for five hours on Saturday and three hours on one afternoon of the week. The subjects were reading, writing, arithmetic, and drawing. The continuation school at present follows the elementary school, and is compulsory for boys to the age of eighteen, and for girls to sixteen. It gives from eight to ten hours of instruction to boys and six hours to girls. There is no fee. The compulsory continuation school is followed in turn by the optional continuation school for persons over eighteen.

A trade school is established in Munich for every trade that has twenty-five or more apprentices. At present fifty trades are provided for. Trades with a great number of apprentices have several schools in different parts of the town to avoid the necessity of extended travel. The one exception is that twelve hundred commercial apprentices are housed in a single building located in the business center of the city.

Associations of employers bear the expense of school material, take part in the arrangement of the courses of instruction, assist in the supervision, co-operate in the examination of apprentices, and generally act as friends and promoters of the school.

France.—In the field of pre-apprenticeship instruction, a number of interesting experiments in the elementary primary are recorded. These schools offer three-year courses, and all are flexible and adapted to local environment. At Marseilles the school is maintained by the co-operation of the municipality, the executive council of the Chamber of Commerce, and the committees on the employment of apprentices and on technical education. The courses are for pupils of twelve to fourteen years, and have the aim of imparting education of the hand and eye in drawing, modelling, and related manual arts. At Villefranche the school has been articulated with industrial and commercial

careers, and the Conseil General has voted it 8,000 francs for the maintenance of scientific courses for which teachers of the local college will be provided as well as experts from the various factories in the vicinity.

Domestic science is now provided in higher schools of agronomic-domestic science established at Grignon, Montpellier, and Rennes, and in the following middle schools: (1) permanent vocational schools in domestic science, corresponding to practical technical schools for boys and offering two-year courses; (2) temporary domestic-science courses for girls unable to attend the above class, annexed to agricultural schools for boys or to other schools under the control of the Minister of Public Instruction; (3) traveling schools of domestic science, of the nature of those already tried in some departments but multiplied in number.

The day or part-time continuation schools intended under the new education act of 1918 for boys and girls between the ages of fourteen and sixteen, and ultimately fourteen and eighteen, remain yet on a voluntary basis. Part-time education is at present undertaken by some of the enlightened employers in the so-called works schools. During the year 1919 there was a marked increase in attendance during working hours. The classes were under the local education authorities, or the employers themselves, who in many instances provided competent instructors for the training of their employees. The establishment of works schools by private enterprise, though encouraged by the board, is viewed by labor with suspicion. Objections are raised that these schools may become biased in form and narrow in scope, and may fail to provide that broad education which is the primary object of day continuation schools.

A memorandum recently prepared by the Labor Party's advisory committee on education states that 'the primary object of the new continuation schools should not be to impart specialized industrial or commercial training, but to give boys and girls a good general education, to develop their physique and character, and to prepare them for intelligent citizenship.'

England.—Industrial education in England may be traced to Dr. George Birkbeck, professor of natural philosophy in Glasgow. He conceived the idea of establishing free lecture courses in science for the workmen. Between 1815 and 1825 Mechanics' Institutions were founded in all parts of England to the

number of two hundred and twenty. Some of these were later converted into technical schools.

Since the Education Act of 1902, a system of industrial training has been gradually developed. In most of the English cities handicraft work for boys and domestic science for girls have been provided, with well-equipped shops and laboratories. There is great variety in details of curriculum and method, but generally the purpose of the work is vocational. In London the children of a group of schools go to 'centers' for this special work, where the proper equipment is found. In 1909 accommodations had been thus provided for more than 80 per cent. of all the children. Handiwork in wood and iron, combined with drawing, is given to all boys who have reached Grade vi. and are eleven years of age, as well as to all boys twelve or more years old below Grade vi. Girls in Grade v. and twelve-year-old girls below Grade v. become eligible to take cookery, laundry work, and house-wifery. A full half day each week is usually given to industrial work. Most of the courses are planned to cover two or three years.

In 1889 authority was given to County Councils to assist vocational education of all grades by local taxation; and in 1890 Parliament supplemented the efforts of local authorities by offering a government grant. As a result of this legislation many high schools have strong courses in science, drawing, and shopwork. Many schools of a distinctly industrial type, such as the Central School of Arts and Crafts in London, have also been established.

Scotland.—The Scottish Education Act relating to vocational schools provides: (1) that it shall be the duty of school boards to make suitable provision in continuation classes for the further instruction of young persons above the age of fourteen years with reference to the crafts and industries practised in the locality; (2) that school boards may be penalized by withholding appropriations for failure to establish continuation classes; (3) that school boards may make attendance compulsory up to the age of seventeen; (4) that employers must report to the school board at specified times, stating particulars as to the hours during which young persons are employed; (5) that employers must provide time for attendance of young persons at the continuation school, and must count the hours spent in such classes in computing the hours of employment of such

young persons; (6) that parents must co-operate with the school board in carrying out the law.

The city of Edinburgh has a complete system of continuation schools. These are classified under four divisions, as follows:

Division I.—Open to pupils from fourteen to sixteen years of age. The subjects of instruction are English, arithmetic, civics, hygiene, drawing, woodwork, commercial documents, needlework, cookery, laundry work, dressmaking, millinery.

Division II.—Open to pupils over sixteen, or under sixteen if they have certain scholastic qualifications. The studies are English, geography, history, civics, foreign languages, commercial subjects, drawing, modelling, mathematics, science, applied mathematics, handwork in wood and iron, ambulance work, physical training.

Division III.—Open to students over sixteen years of age who are qualified. The subjects of instruction are designed to fit the pupil for the practice of crafts. The course includes commercial subjects, art and art crafts, engineering of various kinds, naval architecture, navigation, building trades, textile industries, chemical industries, printing, women's industries, agriculture.

Division IV.—Consists of 'auxiliary classes,' including physical culture, military drill, vocal music, wood-carving, fancy needlework, elocution. These courses are open to all students not included under the compulsory provisions of the law.

For centuries Italy has given special attention to training for the industrial arts. Although the general government has done little to support them, the efforts of local authorities and private initiative have resulted in the opening of many schools for trade training and instruction in the industrial arts.

Switzerland has, through its central government, cantons, and communes, liberally supported its widely extended system of industrial schools. The Scandinavian countries have for more than a generation incorporated into their school system training in the use of tools.

Vocational guidance is extended to school pupils by regular teachers and by so-called vocational counsellors. The phrase Vocational Guidance is relatively new in educational literature but what it stands for is as old as interest in the future welfare of the growing boy and girl. Since 1908, when the late Prof. Frank Parsons of Boston started the Vocational

Bureau, vocational guidance has meant the fortifying of that interest with modern psychology, economics, industrial statistics, research work, and enlightened practice characteristic of good case-work and social service. The reaction of the use of such resources within the school system on the school itself, on the outlook of the teacher, on the plans of parents with regard to their children, on the children themselves, has been marked.

The purpose of the first vocation bureau, that in Boston, was declared by Prof. Parsons, to be 'to aid young people in choosing an occupation, preparing themselves for it, finding an opening in it, and building up a career of efficiency and success; and to help any, young or old, who seek counsel as to opportunities and resources for the betterment of their condition and the means of increasing their economic efficiency.'

Bloomfield says: 'Vocational guidance aims to make both school and occupation help boys and girls to discover and develop their powers for service, through school programs in charge of specially trained vocational counsellors in schools and employment programs in charge of specially trained employment supervisors in the occupation.'

Brewer states that 'vocational guidance is bound up first of all with educational problems, and second with economic and social questions.' He stresses educational guidance and lays down a program that would include: 1. Laying a broad foundation of useful experiences; 2. studying occupational opportunities; 3. choosing an occupation; 4. preparing for the occupation; 5. entering upon work; 6. securing promotions and making adjustments.

The work of the Boston Vocation Bureau (now part of the Harvard University Department of Education) led to the first National Conference on Vocational Guidance (Boston, 1910), followed by similar conferences at New York (1912), and Grand Rapids (1913), and the National Vocational Guidance Association, which held meetings at Richmond, Va. (1914), Oakland, Cal. (1915), Detroit, Mich. (1916), Philadelphia, Pa. (1917), and Atlantic City, N. J. (1918).

In April, 1918, the Bureau of Education sent a post card inquiry to the 10,400 four-year high schools in the United States, requesting data on 'departments or bureaus designed to assist young persons in securing employment.' The object was to secure definite information, for war use, as to the extent of placement work in public high schools. Of

the 5,628 schools replying, 932 reported vocation bureaus, employment departments, or similar devices for placing pupils.

The Boston Vocation Bureau has been succeeded by a fairly complete system of vocational direction for the city, with a director of vocational guidance in charge, a central exchange—the Boston Placement Bureau—and vocational counsellors for every school. New York City has a staff of vocational counsellors. San Francisco created the position of director of vocational guidance in 1916. In 1917 Pittsburgh appointed a director of vocational guidance for the public schools. Chicago, Kansas City, Minneapolis, Cleveland, Newton, Mass., and many other cities, have vocation bureaus or counsellors in the schools.

'The accumulating studies of occupations from various points of view are having a noticeable effect on the practice of vocational guidance and particularly on the available literature of guidance,' says the U. S. Bureau of Education report. 'The teacher is no longer dependent upon the mere *How-to-succeed* books of a few years ago. The books on vocations that confined their attention chiefly to the professions and business are slowly being replaced by books that endeavor to vision, however dimly, the whole industrial and social organization, including the countless types of service whereof the educated men and women of yesterday hardly knew the existence.'

The Boston Vocation Bureau began by employing investigators to make first-hand studies of occupations, to find what an occupation is, its conditions and openings, what it demands of a boy, what it offers in pay and advancement, what opportunities are open for securing the specific training it requires, and what the general conditions of employment are as regards health and effect upon the life of the individual. The information for these leaflets was collected chiefly by personal visits to firms, shops, or factories, and by consultation with employers, superintendents, foremen, employees, and labor men. In the first two years of the Bureau's existence over 100 occupations were investigated, and printed leaflets were issued covering the following occupations: The machinist, banking, the baker, confectionery manufacture, the architect, the landscape architect, the grocer, bookkeeping and accounting, the department store and its opportunities for young men.

The stated objects of these bulletins were: 1. to present vocational facts simply and accurately; 2. to make accessible a knowledge

of all the employments; the professions, as well as the trades, skilled and semiskilled and unskilled; the business, the home-making, and governmental callings, and also any new and significant vocational activities of men and women; 3. so far as possible to supply parents, teachers, and others interested, with the material necessary for an intelligent consideration of the occupations, their needs, demands, opportunities, relative desirability, training requirements, and the possibilities they may offer for careers; 4. to analyze the relation of vocational aptitudes, interests, and habits to modern industrial demands, and thus lay an adequate foundation for a system of training regardful of social as well as economic needs.

There are four methods of presenting vocational information to pupils; 1. through vocational talks by representatives of the vocations; 2. through vocational pamphlets; 3. through the study of English, civics, and other school subjects; 4. through regular courses in vocational information; 5. through visits to the plants of various industries.

The Grand Rapids plan of vocational guidance through English composition is a common-sense recognition of the fact that English composition, like certain other school subjects, is a tool subject, and that children may well sharpen their tools on useful things. In Grand Rapids the plan is systematized, so that one year the student is reading and writing on the lives of men and women who were conspicuous exponents of certain vocations, and another year he is building plans for his own career.

The following outline for the study of a vocation in such a course is suggested by the National Education Commission on the Reorganization of Secondary Education:

I. General statement concerning the vocation: 1. Value of the vocation as a social service. 2. Duties of one engaged in it. 3. Number engaged in it in local community. 4. Relative number engaged in it in general, with its probable future development. 5. Relative capital invested in it.

II. Personal qualities demanded: 1. Qualities of manner, temperament, character. 2. Mental ability. 3. Physical demands.

III. Preparation required: 1. General education. 2. Special or vocational education. 3. Apprenticeship conditions. 4. Experience required.

IV. Wages earned by workers: 1. Range of wages made (table showing distribution of all cases). 2. Average wage per week. 3. Re-

lation of wage to length of experience and preparation.

V. Length of working seasons, working week, working day, etc.

VI. Health of the workers: 1. Healthful or unhealthful conditions. 2. Dangers, accidents, or risks.

VII. Opportunities for employment: 1. In local community. 2. In general.

VIII. Organization of the industry, including the relations of the worker to his fellow workers, his employers, and the community.

IX. Status of the workers: 1. Opportunities for advancement. 2. Time for recreation and enjoyment. 3. Adequate income for recreation and the comforts of life. 4. Any other items of peculiar interest in this connection.

The Boston Plan.—The Boston organization consists of a department of vocational guidance in charge of a director with two vocational assistants, one temporary vocational assistant, and two clerks. The Boston Placement Bureau, formerly financed by private funds, was taken over by the school committee in 1917. The central office, in charge of the director, serves as a co-ordinating agency to bring together information about successful practices throughout the city. It has been described as a 'clearing house for experimentation methods and ways and means.' Under the auspices of the central office, conferences are held in which teachers from the high schools and elementary schools take part. The workers in the central office are engaged in three types of work—investigating occupations, giving counsel to pupils and working children who call at the office, and aiding in the placement of high-school students and graduates. Considerable educational guidance is undertaken by the department, the theory being that with high-school attendance assured, the problem of the vocational counsellors in the elementary schools becomes largely that of aiding the child in its selection of a high-school course.

Every high school and elementary school in Boston has vocational counsellors. These are teachers who have had special training for counselling under the Boston Vocation Bureau, Harvard University, or Boston University. They serve without extra compensation.

In the Boston high schools there is a definite system of placement, co-ordinating through the central placement bureau. During the closing weeks of the school year, members of the staff interview personally each pupil in the graduating classes. In most

of the schools two or three teachers are allowed part time for counselling individuals. Part-time work, especially in department stores and during the summer vacation, is utilized for guidance purposes. The distinguishing feature of the research department is the psychological laboratory, which serves as a child-study department for the public schools.

The Chicago Vocational Bureau was established in 1911 by the joint committee for vocational supervision, a committee organized by the Chicago Woman's Club, the Woman's City Club, and the Association of Collegiate Alumnae. In March, 1916, the board of education took over the bureau. The definite purposes of the vocational bureau are: First, to study industrial opportunities open to boys and girls with respect to wages and the requirements necessary to enter an occupation, the age at which beginners enter the occupations, the nature of the work, the chances for advancement and development—in short, to gather the greatest possible amount of information regarding industrial conditions, in order to advise boys and girls and to give them a start in their careers as workers; second, to advise the children about to leave school and to urge them to remain in school when possible; third, when every effort to retain them in school has failed, to place in positions those children who need assistance in securing employment; fourth, to follow up and supervise every child who has been placed, advising him to take advantage of every opportunity for further training.

Summary.—A survey of vocational guidance, conducted by Dr. Carson Ryan of the Federal Bureau of Education, concludes with the following statement:

1. Vocational guidance in the public schools is not to be confined to individual counselling by a vocation bureau or by a teacher, but is to be regarded as a movement having as its purpose a better distribution of human service. It implies broadening the program of studies to include a systematic study of the industrial organization of society. 'The thought of vocational guidance must live in every phase of educational work from its earliest beginnings.'

2. Study of individual aptitudes has made relatively slow progress. Vocational psychology, while of high promise to the vocational guidance movement, is not yet regarded, even by psychologists, as of much direct value in any system of vocational guidance for schools.

3. It is in the field of occupational information that most progress has been made. The important developments in this field have made possible a variety of successful plans for imparting vocational information to pupils in school.

4. The most hopeful next step in guidance work is the interesting of teachers in the world of occupations. A program of vocational guidance for any school system implies teachers who are familiar with the history of modern industry, who have studied social movements, and who believe in the worthiness of all human service. Teachers are logical agents of society in making its work known.

5. The general public will need to be educated in the importance of schooling, and particularly to the necessity of differentiated courses. Employers and labor leaders will need to be utilized as co-operating factors in bringing the school and industry together in such a way as to result in better industry and a better school.

6. Systems of vocational guidance for large cities will usually grow out of vocational education, though they should not be allowed to be subordinated to it. An assistant superintendent or a special director should be in charge and should have considerable latitude in regard to making suggestions for other departments of the school system. In smaller cities vocational guidance will be one of the chief functions of the superintendent.

7. Communities initiating systems of vocational guidance should be particularly careful to use the services of existing agencies. Vocational guidance touches so many phases of human life and labor that practically every social agency can make some contribution to it.

8. Vocational guidance has special significance for the United States in the light of problems raised by the war. Notwithstanding the repeated warnings given by England and France, entirely too many boys and girls are leaving school to go into industry because of the lure of high wages. The school should do its best to keep as many as possible. Over those who go into employment it should exercise supervision, following them up in the hope of reclaiming some of them for education when war employment is past. The school can route many of the boys into more permanent lines of work, and can emphasize the value of training both for temporary war service and for the reconstruction period after the war. To help effectively in this movement the schools must establish con-

tacts few of them now have with labor unions, employers, and the general public. It is only by being thus equipped that the public schools can take the leadership in a movement as fundamental as that for vocational guidance, which has within it the possibilities for a complete reorganization of industrial and social life.

Consult Keller's *The Double-Purpose High School* (1953); Cohen's *Vocational Training Directory of U. S.* (1953).

Vodka, or **Russian Brandy**, a harsh, noxious, fiery spirit, containing about 40 per cent. alcohol, prepared mainly from rye, but also from a mixture of barley, oats, and rye, from potatoes, and from maize. Prior to the World War I the consumption of vodka in Russia had reached enormous proportions. In 1894 its sale was made an absolute government monopoly, and proceeds from that source constituted a large percentage of the national revenues—almost 25 per cent. in 1914. In the fall of that year an imperial edict was issued abolishing the trade for the period of the war; and on June 30, 1916, an act was passed by the Duma making its prohibition permanent. Under the Soviet regime, however, the prohibition was ignored and with the repeal of the prohibition laws in the United States vodka reappeared in this country under the imprint of Soviet manufacture.

Voice and Voice Training. Voice is sound generated in the larynx. Generally speaking, the smaller the size of the larynx, the higher the pitch of the voice, and *vice versa*. From the age of six until nearing the period of puberty the larynx is approximately similar in size in both sexes; but in adults the larynx is about a third larger in males than it is in females, and the male voice is generally an octave lower in pitch than the female. Six species of singing voice are now recognized—*viz.* bass, baritone, tenor (male); contralto, mezzo-soprano and soprano (female). The classification of voices is determined by the nature of their timbre, and not by their extent of compass. In each species the average compass ranges from a little under to a little over two octaves, a compass of three octaves being exceptional. The lowest musical sound known to be capable of production by the human voice is the note G below the bass stave, the highest is B an octave above the treble (B, in *alt.*). A series of notes of approximately similar quality is termed a 'register.' At the junction of certain registers a certain number of notes may be produced either as

higher notes of the lower or as lower notes of the higher register, and the change of register should always be made upon one of these 'optional' tones. When the change is only barely perceptible, the registers are said to be perfectly 'united' or 'blended.' The familiar terms 'chest-voice' and 'head-voice' date from the period when it was not known that all voice originates in the larynx.

The voice is said to be correctly 'placed' when it is directed towards the frontal portion of the roof of the mouth, and a sense of strong vibration is felt in the bridge of the nose. Each tone, whether loud or soft, must be 'attacked' with decision, but not in an 'explosive' manner, and any tendency to 'scoop' up to the notes must be instantly checked. See Morell Mackenzie's *The Hygiene of the Vocal Organs* (5th ed. 1888); Brown and Behnke's *Voice, Song, and Speech* (15th ed. 1893); Curtis's *Voice Building and Tone Placing* (2d ed. 1900); Sims Reeves's *The Art of Singing* (1900); Ellis's *Speech in Song* (1878); Newland's *Voice Production* (1906); Osborne, *Your Voice Personality* (1938).

Void and Voidable. A transaction is void if it has no legal effect from its inception, as a contract to commit a crime, or to enter into any obligation of a nature prohibited by law. It is voidable when not illegal, but for some legal reason one party thereto may disaffirm and refuse to be bound by it.

Volapük, an artificial language, invented in 1879 by Schleyer of Constance, Baden, for international use.

Volcanoes are typically mountains of conical form, which discharge steam and other gases, ashes, and lava through a cup-shaped orifice or crater, situated near the summit. Vesuvius, near Naples, is the best known example. During violent eruptions the material ejected is sometimes thrown to a prodigious height. A small central cone is often built up within the main crater, and from it the steam and ashes are emitted. The existing Vesuvius has been gradually piled up on the depressed edges of the great crater bowl of Monte Somma, whose remaining walls partially encompass the Vesuvian cone. In the Phlegrean Fields near Naples are many small volcanoes, extinct or in a quiescent state, and discharging only carbon dioxide and sulphurous gases. This is known as the solfataric condition, named from one of these minor cones (the Solfatara). At Vesuvius, during normal conditions, only small quantities of steam, mixed with sulphurous gases and volcanic ashes, are emitted. Greater activity is marked by the

ascent of large gray steam clouds, which ascend vertically for several thousand feet, then spread out and flatten like the top of a pine tree. Larger blocks of lava, known as bombs, are ejected with the steam. After a longer or shorter duration of this phase the lava rises in the crater and wells out through some opening in its sides. The lavas are red hot at first, but rapidly cool, and then have a rough, slaggy crust, under which the liquid interior mass continues to advance. Great quantities of water are dissolved in the lavas, and enormous steam clouds mark their progress. See *VESUVIUS*.

Etna, near the eastern border of the island of Sicily, is hardly less famous as a volcano than Vesuvius, and its known periods of activity extend back to a much earlier date than those of its continental neighbor. The Lipari Is., off the n.e. of Sicily, contain many volcanoes. Of these Vulcano has had several eruptions in recent years, and Stromboli is in a state of almost constant activity.

For the more powerful manifestations of volcanic activity, however, we must pass to Java, Japan, New Zealand, the West Indies, and the Hawaiian Islands. Two main types of great eruptions may be distinguished—the explosive and the effusive. In the former the activity is very violent, but brief and intermittent. Usually these volcanoes rest for many years, then have an eruption which lasts for a few weeks or a few days. Krakatoa is a good instance. It is an island in the Sunda Straits, between Java and Sumatra. In 1883, after two centuries of repose, it again became active. On the 26th August a gigantic explosion took place. One-half of the adjacent island of Rakata was blown away, and the depth of the great submerged crater, on the edge of which Rakata stood, was increased to nearly 200 fathoms. The ashes were projected into the air to such a height that the finest of them were carried all over the world, and for months afterwards occasioned brilliant sunset effects in all latitudes. Great sea-waves, from 70 to 100 ft. high, started from the crater and devastated the surrounding coasts, drowning many thousands of people. The waves crossed the oceans in all directions, and were traced by their effects on the tide gauges even in California and the Isthmus of Panama. Similar waves were produced in the atmosphere, and circled round the whole globe.

In 1886 a great explosive eruption suddenly took place in the North Island of New Zealand in the hot-springs districts around Lake Tarawera. The white and pink terraces of

Rotomahana were destroyed, and a fissure eleven m. long was opened, out of which steam and ashes proceeded. The eruption lasted only a few hours. The most deadly outbursts of this type are those of the West Indian volcanoes, Pelée in Martinique and La Soufrière in St. Vincent. In 1902, after a brief preliminary phase, they burst into activity, and discharged not only the ordinary clouds of steam and ashes, but also black clouds or burning clouds, composed of superheated steam and incandescent dust. These rolled like torrents of water down the slopes of the mountains. About 2,000 people perished (May 7) in St. Vincent, while in Martinique, the city of St. Pierre, with its 30,000 inhabitants (including those in the suburbs), was destroyed (May 8) in a few minutes. A later eruption (August 30, 1902) of Pelée was equally paroxysmal. A singular feature in the activity of Pelée was the vast obelisk of rock (lava) which was thrust through its crater, and at the time of its greatest development attained a height above the summit of the volcano of upwards of 1,000 feet.

The second type of volcanic activity, the effusive, is characterized by the emission of floods of lava, which deluge large tracts of country. The best examples are found in the Sandwich Islands, and are great cones rising to upwards of 13,000 ft. above sea-level. They are composed principally of black basaltic lava flows, while beds of ashes, indicating explosive volcanic action, are few or wanting. The principal crater is Kilauea, a low-lying great flat-bottomed pit 2 or 3 m. across, with vertical sides, rising from 700 to 900 ft. above the interior floor of lava. In the center of this crater there is a 'lake of fire.' Certain also of the Icelandic volcanoes have discharged great lava-flows. In 1783 Skaptar Jökul emitted a flood of basalt, which has been estimated to have a mass equal to that of Mont Blanc. In one direction it extended for 50 m., and its breadth in places was from 12 to 15 m., its depth in some parts 800 ft.

The geographical distribution of active volcanoes is a subject of great interest. By far the greater number stand near the sea; this is probably due to the fact that many coast-lines are determined by earth-folds. A great ring of volcanoes encircles the Pacific. It includes the volcanoes of Kamchatka, the Kuriles, Japan, the Liu-Kiu Is., Philippines, Java, Sumatra, New Zealand, and the Antarctic (*Erebus and Terror*). It is continued in Patagonia and the Andes (*Sahama, Misti, Chimborazo, Cotopaxi, Pichíncha, etc.*), Central

America, Mexico (Orizaba, Popocatepetl, Jorullo, Colima), Western N. America (Cascade Mts., where there are many volcanoes, recently extinct or faintly active—Shasta, Hood, Rainier, Baker), and Alaska. Branches of this great chain are found in the W. Indies, and in Sumatra and the islands of the Indian Ocean. Along the center of the Atlantic there lies a ridge, capped with volcanic islets—e. g. Tristan d'Acunha, St. Helena, Ascension, Cape Verde Is., Canary Is., and Azores. Nearer the Arctic are Iceland and Jan Mayen. In the Indian Ocean the principal volcanoes are those of Madagascar, Mauritius, Réunion, St. Paul I. A number of cones occur in Africa, including Kilima-Njaro, Kenia (both seemingly extinct or dormant) and the mountains of the M'fumbiro group. They lie along a set of fissures, which pass northwards into the Red Sea, and thence into Syria and Palestine. In western equatorial Africa are the Cameroons. The Alpine system of recent mountain folding, with its extensions into the Apennines, the Balkans, Carpathians, Caucasus, and Himalaya are accompanied in many districts by volcanoes, active or recently extinct. These incl. the Ital. volc. already mentioned, the extinct cones of S. Spain, the Auvergne, the Eifel, Hungary, and Asia Minor. Ararat, Demavend in Persia, and certain volc. in C. Asia continue this series to the E. New volcano materialized, 1952, on San Benedicto Is., Mexico; grew 1050 ft. in 6 weeks.

It is clear that at depths of a few m. in the earth's crust, esp. in regions undergoing or having recently undergone the process of folding, great masses of rock exist at a high temp. and under great pressure. They contain much water vapor, occluded, but ready to expand when the pressure is relieved. The temp. is not less than 1,200° C., and may be considerably above this.

Volga, r. Russia, the longest river of Eur., rises in the Valdai plateau in the Government of Tver, flows e. as far as Kazan, turns s., s.w., and s.e., following a course of more than 2,300 m., to the Caspian Sea, which it enters through a large delta, on which Astrakhan is situated. Chief tributaries: Mologa, Kostroma, Unsha, Oka, Vetluga, Kama, Sura, and Irghis. Oka and Kama are themselves large rivers. Its course is generally smooth and tranquil, and it carries a large volume of traffic. Small vessels can ascend as far as Rjev and large ones to Tver. Chief ports: Astrakhan, Tsaritsyn, Saratov, Samara, Kazan, Nijni-Novgorod and Yaroslavl.

Volhynia, county of Poland, formerly a

part of the Soviet Republic of Ukraine; area 27,743 sq. m. It is marshy in the n., but the southern part is traversed by steep hills intersected by deep valleys. Agriculture is carried on in the s., wheat, rye, oats, barley and sugar beets being the chief products. Zitomir is the capital; p. 1,438,000.

Volition. See Will.

Volk, Douglas (1856-1935), American artist, was born in Pittsfield, Mass. He studied in Rome and under Gerôme in Paris, and in 1879-84, and again in 1908-12, was instructor in Cooper Union, New York City. He organized the Minneapolis School of Fine Arts, of which he became director in 1893, and in 1910-19 was instructor in the National Academy of Design, New York City. He is a member of the National Academy. Among his paintings, which usually combine landscape and figures, are several in the Metropolitan Museum, New York, and *Boy with Arrow* in the National Museum, Washington.

Volo, city, Greece, on the Gulf of Volo; 37 m. s.e. of Larissa. It has a good harbor and is an important center for exporting. Nearby are the sites of the ancient cities of Demetrias, Iolius, and Pagasæ; p. 30,046.

Vologda, former government, northeastern Russia, bounded on the n. by Archangel, and on the e. by the Ural range, now included in the Russian Socialist Federal Soviet Republic; area 155,498 sq. m. It is mountainous in the e., the remainder of the surface being an undulating plain watered by the Dvina and the Petchora. Forests cover nearly the whole region and hunting, fishing, and lumbering are the leading industries; p. 1,700,000, mostly Russians, capital Vologda; p. 58,816.

Volsci, ancient Italian people, who inhabited the eastern half of Latium. Their chief towns were Antium, Satricum, Privernum, Arpinum, and Fregellae. About the third century B.C. they became Roman citizens.

Volstead, Andrew J. (1860-1947), American public official, born in Goodhue Co., Minn. In 1903 he was elected to Congress and successively reelected until 1923. He was the author of the Volstead Act for federal prohibition and also of the Farmers' Co-operative Marketing Act. In 1924 he became legal adviser to prohibition organizations, and later practiced law at Granite Falls, Minn.

Volt, the practical electric unit of electromotive force (E.M.F.), equalling 10⁸ c.g.s. electromagnetic units of electromotive force. The standard of E.M.F. is taken as a Clark cell, which gives at 15° C. 1.434 volts, when prepared in accordance with certain definite

specifications. The volt is the electromotive force applied to a conductor whose resistance is one ohm that will produce a current of one ampere. The volt was named in honor of Alessandro Volta. See ELECTRICITY, CURRENT.

Volta, Alessandro, Count (1745-1827), Italian physicist, was born in Como. In 1779 he was elected professor in Pavia University, and in 1815 the Emperor Francis appointed him director of the philosophical faculty of Padua, from which he retired in 1819. Volta constructed the earliest absolute electrometer and the electric pile, the latter of which was first described in a letter to the Royal Society of London, March 20, 1800. His *Opere Complete* were published in 1876.

Voltaic Cell. See **Cell, Voltaic.**

Voltaire, assumed name of **Jean François Marie Arouet** (1694-1778), French writer, who was born in Paris, son of an official of one of the high courts. He was educated at the Jesuit Seminary of the College of Louis-le-Grand in Paris, and as a young man entered into the intellectual life of Paris, where he became known for his wit. After some time spent in the study of law, he wrote a foolish satire on the regent (the Duc d'Orleans), for which he was imprisoned (1717) in the Bastille. On his release, his play *Œdipe* was produced at the Théâtre Français, and proved a brilliant success. He then took the name of Voltaire.

In 1724 the play *Mariamne* was produced, but an unfortunate quarrel led to the young man's second imprisonment in 1726. Shortly before this, his *La Henriade*, a noble poem on Henry IV., had appeared. On being released from the Bastille Voltaire went to England (1726-9), and on his return to Paris devoted himself to literature and to commercial speculations, from which he realized a large fortune. But his indignation over certain acts of the clergy and his contempt for court sycophancy and intrigue led him to express his opinions with satiric bitterness in his *Lettres philosophiques* (1733) and *Epique à Uranie*.

With a friend, Madame Du Châtelet, and her husband he retired to Cirey, a château on the borders of Champagne and Lorraine, where from 1734 to 1749 he resided, immersed in study and literary labors. During this period some of his best work was executed—the three plays, *Aisire*, *Mahomet*, *Mérope*; his *English Letters*; his satiric poem *La pucelle*; his philosophical works, *The Treatise on Metaphysics* and *Essai sur les mœurs et l'esprit des nations*, which, with all its defects, still takes rank as one of his finest

treatises; *Zadig*; and his Eastern romances.

In 1740 Frederick the Great of Prussia invited Voltaire to visit him, and although the invitation was not accepted until a year or two later, an intimacy was established between the monarch and the man of letters, and in 1743 Voltaire was sent on a secret mission to Frederick. For this service, through the influence of Louis XV., he was elected a member of the French Academy (1746), and appointed historiographer-royal. After the death of Madame du Châtelet (1749) Voltaire decided to visit Frederick of Prussia in Berlin (1751), where he spent three years, his only duty being to correct his majesty's writings. While there he published his *Siècle de Louis Quatorze*.

After leading an unsettled and migratory life for some years, Voltaire finally settled down at Ferney, near Geneva, where he spent the last twenty years of his life. *Candide*, *Siècle de Louis Quinze*, *Dictionnaire philosophique*, *A Treatise on Toleration*, and his last tragedy, *Irène*, all fall within this period. His rancor against the church increased with years, and from his retirement he discharged a ceaseless succession of satiric shafts at the clergy and their dupes. In the Calas affair, as the champion of the weak and the downtrodden, he was able to clear the memory of a dead man from a foul aspersion cast on it by the priests. Voltaire died while on a visit to Paris. The curé of St. Sulpice refused to inter the body, and the remains were hurriedly buried in the Abbey of Scellières. In 1791 the body was transferred to the Panthéon, but during the excitement of the 'hundred days' it was removed, and thereafter all trace of it is said to be lost.

Voltaire as a poet fails to touch the heart, nor does he ever appeal to the deeper sympathies of human nature. His dramas are ill-constructed, but they abound in apt and clever character sketches, and reveal a great fund of wit. As a satirist he is one of the greatest the world has seen. The best edition of his *Œuvres* is that by Moland in 32 vols. The best *Lives* are those by Desnoiresterres (8 vols.), James Parton, and Tallentyre (2 vols.). Consult also Morley's *Voltaire*; biographies by Hamley (Foreign Classics for English Readers), by Espinasse (Great Writers Series); Lounsbury's *Shakespeare and Voltaire*.

Voltmeter, the name given to an instrument which measures current strength by the amount of a given electrolyte decomposed in a given time. See ELECTRICITY, CURRENT.

Volterra, town, Italy, in the province of Pisa; 32 m. s.e. of Pisa. Features of interest are the fine Romanesque cathedral, consecrated in 1120; the national museum, in the Tagassi palace, which contains an interesting Etruscan collection; and the Palazzo del Priori, now used as the town hall. The old Etruscan walls are still preserved at many points. There are manufactures of alabaster, iron, and salt; p. 16,000.

Volterra, Daniel da (c. 1509-65), Italian artist, whose real name was Daniele Ricciarelli, was born in Volterra. He became an assistant of Michelangelo, painting some of the great Florentine's designs, especially David and Goliath (Louvre). In later life he excelled as a sculptor. His masterpiece in painting is *The Descent from the Cross*, a fresco in the church of the Trinità de Monti at Rome.

Voltmeter, an instrument for measuring the difference in electrical potential between two points which are charged or between which a current is flowing. The most usual form of voltmeter for continuous current is a modification of the D'Arsonval galvanometer in portable form. Here a suspended coil through which the current passes is mounted on jewel bearings between the poles of a horseshoe magnet. When this coil is connected in series with a resistance of sufficient amount, the current flowing through the coil is proportional to the difference of potential. In other instruments the current flows through a fine wire of high resistance whose length varies with the heating caused by current and causes a pointer to move over a graduated scale. In still another form a piece of soft iron is pivoted between the poles. In the electrostatic voltmeter the action depends upon the attraction and repulsion of two light metal vanes connected with the poles of the dynamo.

Voltmeters of the 'hot-wire' and electrostatic type are suitable for both alternating and direct currents. Alternating current voltmeters are of three common types: (1) electro-dynamometer, (2) induction, (3) magnetic vane. In the electro-dynamometer type the permanent magnet of the d.c. D'Arsonval instrument is replaced by an electromagnet coil; there is usually, in addition, a series resistance to minimize frequency and temperature errors. Inasmuch as the coils are in series the periodic reversals of alternating current will result in a deflection of the movable coil in the same direction regardless of the instantaneous direction of flow of the current.

In the induction type a conducting cylinder or disk is subjected to a rotating or shifting field produced in a manner analogous to that utilized in the single-phase induction motor. In the magnetic vane type, two pieces of soft iron, one fixed and the other part of the moving system are inductively magnetized by a coil surrounding them. The magnetic reaction results in deflection of the pointer over a scale graduated in volts.

Voltri, town, Italy, in the province of Genoa, on the Gulf of Genoa, 9 m. n.w. of Genoa. Industries include paper, cotton and woolen goods, iron, and shipbuilding. The French under Masséna were defeated by the Austrians in 1800; p. (1901) 14,815.

Voluntaryism, the theory which maintains that churches and clergymen should be supported by voluntary contributions, and not depend upon state aid, and this in the interest of religious liberty and equality. In England there is a Liberation Society formed to advocate these principles through its organ, the *Liberator*, and a Church Committee for Church Defence, organized to defend the opposing view. In the United States voluntaryism is of course the universal principle.

Volunteers, organized military bodies whose members serve of their own volition, with the view to supplementing the regular force in case of war or other exigency. The volunteer movement originated in Great Britain, where at various times there have been organizations of men in time of threatened dangers dating from the establishment of Napoleon's camp at Boulogne in 1803. In the United States regiments of volunteers have been regularly enlisted for various wars such as the Civil and Spanish wars by the national government. Such organizations were provided for by different statutes from 1792 down to the present, their status being more definitely fixed by recent militia legislation and army plans and reorganization. In the War of 1812, in addition to 458,463 militia, 10,110 volunteers served; in the Mexican War, 73,766 volunteers were enlisted, while practically the entire Northern army in the Civil War was made up of volunteer regiments, as the regular establishment in point of numbers was quite inadequate for a war of such magnitude. Later, in the Spanish-American War, two calls were issued for volunteers to the number of 125,000 in the first instance and 75,000 at the second call. These volunteers, numbering 10,668 officers and 220,213 men were individually enlisted in the U. S. service, although in many cases existing militia organ-

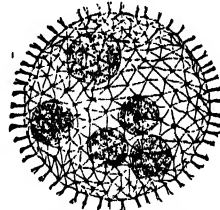
izations served as the basis for the new volunteer regiments. Volunteer officers in the service of the United States are commissioned by the President and rank with regular officers, being entitled to the same honors and privileges in their respective grades. The uniform is the same except that the letters U. S. V. appear. Naval volunteers are also enlisted in case of war in the United States, the naval reserve or naval militia usually supplying the basis for such organizations.

Volunteers of America, a religious and philanthropic organization founded March 9, 1896, by Commander and Mrs. Ballington Booth, formerly of the Salvation Army, in part as a protest against what was deemed the too rigid militarism of Salvation Army methods. The organization was incorporated Nov. 6 of the same year under the laws of the state of New York, and is democratic in constitution. The chief governing body is named the Grand Field Council, while the board of directors consists of eleven members elected by the council. At the first meeting of the latter, Dec. 1-7, 1896, constitution and by-laws were framed, organization was completed, and plans of work were formed.

The work of the society is two-fold, religious and philanthropic. The religious work includes: (1) meetings for adults for worship, including the administration of the Lord's Supper, these being held in districts where the service of the churches seems ineffective; and (2) Sunday-schools for the religious instruction of children. The philanthropic work is comprehensive, and includes care for destitute children and mothers with children, working girls, working men, and the unemployed, prisoners in state prisons, and discharged prisoners. Two homes for destitute children are located in the East and two in the far West; fresh-air camps are supported near Darien, Conn., at Youngstown, Ohio, and on Lake Michigan, near Chicago; five homes for working girls are established in Boston, Buffalo, Minneapolis, Chicago, and Detroit; homes for working men are located in Worcester, Mass., Philadelphia, Pittsburgh, and Erie, Pa., Joliet, Ill., Denver, Col., and Los Angeles, Cal.; homes for discharged prisoners are maintained at Orangeburgh, N. Y., Joliet, Ill., and Fort Dodge, Iowa; free dispensaries for the supply of drugs to the needy are provided at Chicago and Toledo. The organization has been exceptionally successful in its work among prisoners. It has formed a Volunteer Prisoners' League for the betterment of conditions of government in prisons. It presents

a pledge to the prisoners for voluntary signature, which involves the promise voluntary to maintain prison discipline and otherwise to live uprightly while under confinement. Over 15,000 prisoners have signed this, and wardens of the prisons testify to the beneficial effects upon the institutions and the inmates. This department is under the direct supervision of Mrs. Ballington Booth. Over one hundred stations for philanthropic work are in operation in the United States, and activities are being extended to other lands. The headquarters are at 38 Cooper Square, New York.

Volvox, a colonial flagellate protozoan which is so plantlike in its characters that it is by botanists usually included in the Alga: Volvox is a hollow ball of cells, the cells being embedded in a membranous envelope. The method of nutrition is entirely plantlike.



Volvox globator.

Volvulus, a condition of the intestine in which a part is twisted or kinked, so that the passage is closed. It is thought to be caused by accumulation of gas, or by chronic constipation. Symptoms are acute pain in the abdomen, often distinctly located, with constipation and vomiting, the onset being rapid.

Vomiting, the forcible expulsion of the contents of the stomach through the œsophagus. The act is generally preceded by nausea and a rush of saliva. Vomiting may be excited by stimulation of the vomiting center in the medulla, and various afferent nerves. The stimuli capable of exciting vomiting are exceedingly numerous. Ice, bismuth, hydrocyanic acid, opium, and morphine are local antiemetics, and counter-irritation over the stomach acts in similar fashion. Opium, morphine, and hydrocyanic acid have also a sedative action on the vomiting center, whose irritability is likewise decreased by such drugs as chloral, potassium bromide, belladonna, and creosote.

Vonnob, Robert William (1858-1933), American portrait, figure, and landscape painter, born in Hartford, Conn., and a pupil,

first of the Boston Normal Art School, and then (1881-3) of Boulanger and Lefebvre in Paris. After his return from Europe in 1885, he taught painting at Boston Museum, and afterwards (1891-6) at Philadelphia. He received medals at Paris in 1889, Chicago (1893), and the Proctor Prize at the National Academy of Design in 1904. He was made an associate of the National Academy in 1906. BESSIE (POTTER) VONNOH, his wife (1872), was born in St. Louis. Her chief work has been in miniature figures somewhat after the style of Tanagra figurines. Her *Dancing Girl*, *Reading Girl*, and the group of mother and children at St. Louis in 1904, called *Motherhood*, have been widely praised owing to their grace and simplicity. She was awarded a bronze medal at Paris in 1900, and a gold medal at St. Louis in 1904.

Von Stroheim, Erich (1885-), motion picture director, actor and author, was born in Vienna. He came to the United States in 1909 and has since written and directed numerous motion pictures and has acted in many of them. He starred in *Three Faces East*, *The Lost Squadron* and supported Greta Garbo in *As You Desire Me*. In 1926 he was elected by All American Critics as the best director.

Voodooism, a degraded form of religion, prevalent among the negroes of the West Indies and the southern part of the United States. It is supposed to be a relic of the fetishistic religion of equatorial Africa; and the word is probably derived from *vaudoux* ('negro sorcerer'), a Creole form of the French *Vaudois* (Waldenses), who were represented by their enemies as addicted to the practice of sorcery and necromancy.

Vorarlberg, prov. Austria, w. of Tyrol; forms with Tyrol a division of Austria. It covers 1,004 sq. m. The capital is Bregenz. Cattle and goats are raised, and milk products exported; p. (mainly German and Roman Catholic), 140,000.

Voronezh, province in central Russia. Area, 25,443 sq. m.; p. 3,308,400. The surface is a rolling plain and belongs to the Don basin. Capital, Voronezh; p. 120,017.

Vörösmarty, Michael (1800-55), Hungarian poet, born at Nyék, Stuhlweissenburg co. He became a teacher and afterwards an advocate, but soon abandoned law for literature. He is best known as the writer of the Hungarian national song *Szósát* (1840); but he also wrote plays and epic poems (e.g. *Zalán Futása*, *Cserhalom*. Eger) which secured for him the membership of the Hungarian

Academy (1830), and subsequently its secretaryship. A complete edition of his works was issued by P. Gyulai (1884) in 12 vols.

Vortex, in hydrodynamics, a kind of motion in which we imagine the smallest parts of the fluid to be whirling or rotating. We owe to Helmholtz the complete investigation of the fundamental properties of vortex motion in a perfect frictionless or non-viscous fluid. In such a fluid it is not possible either to create or to destroy vortex motion, the property of vorticity being possessed once for all or never. We may imagine the vorticity at a point in a fluid to be represented by a vector drawn perpendicular to the plane of molecular rotation and of length equal to the amount of the vorticity. As we proceed along this line we necessarily pass to an immediately contiguous element also possessing vorticity. The vortex line or filament so traced out will either terminate at the boundary of the fluid or form a re-entrant closed path coming back to the point from which we started. This gives us the vortex ring. Such a vortex ring will always be composed of the same elements of fluid. It was this conception which led Lord Kelvin to his theory of the vortex atom. The properties just mentioned belong to vortex motion in a non-viscous fluid. But practically there are no such fluids. Because of the existence of viscosity we can create evanescent vortex motions in fluids. Such, for example, are the smoke rings produced at the funnel of a locomotive or at the mouth of a skilful smoker.

Vorticella, or **Bell-animalcule**, a ciliate protozoon, found abundantly in ponds and ditches, and even in vegetable infusions. In general appearance it is like an inverted bell, with a long handle, which forms the stalk that attaches the protozoon to the substratum, and has a contractile filament running down its center. When this filament contracts it throws the stalk into a spiral, and thus brings the bell close down to the substratum. The bell constitutes the body of the animalcule. It is fringed with cilia round the margin, but what would be the mouth of the bell is largely filled up by a plug, called the disc, which also bears cilia. Between the disc and the margin is a groove leading into the interior, which corresponds to the mouth of Paramecium. Internally there are two nuclei, a large and a small, a contractile vacuole and food vacuoles, much as in other Protozoa. Vorticella is a solitary form; but its near ally Carchesium is colonial, a number of bells occurring on one stalk. The ordinary method of reproduction

is by fission. But a process of conjugation occurs in that two or more small free bells swim away, and attach themselves to a full grown stationary bell. These then completely fuse together, so that a zygote is formed, which again begins to divide in the usual fashion.

Vos, Geerhardus (1862), Holland-American theologian, was born in Heerenveen, Holland. He came to the U. S. in youth; studied at Princeton Theological Seminary; and took the PH.D. degree at the University of Strassburg in 1888. From 1888 to 1893 he was a professor in the theological school of the Holland Christian Reformed Church, Grand Rapids, Mich., and after 1893 professor of Biblical theology at Princeton Theological Seminary. Among his works are: *The Mosaic Origin of the Pentateuchal Codes* (1886); and *The Teaching of Jesus Concerning the Kingdom of God and the Church* (1903).

Vos, Maertin de (1532-1603), a Flemish painter, born at Antwerp, where he became dean of the painters' guild (1517); was a prolific artist, his portraits being less corrupted by the Italian spirit than those of his compatriots. He possessed a fertile invention, a ready pencil, and a coloring approaching that of Tintoretto.

Vose, George Leonard (1831-1910), American civil engineer, born in Augusta, Me., was educated in the Lawrence Scientific School of Harvard University, and was employed in railroad constructing until 1859. In 1859-63 he was associate editor of *The American Railroad Times*. He was professor of civil engineering in Bowdoin College, Me. (1872-81), and in the Massachusetts Institute of Technology (1881-86). His principal works are: *Handbook of Railroad Construction* (1857); *Manual for Railroad Engineers* (1873); *A Graphic Method for Solving Algebraic Problems* (1875); *Memoir of George W. Whistler* (1887); and *Bridge Disasters in America* (1887).

Vosges, a frontier dep. of E. France, abutting on Alsace. The surface is mountainous, with the Vosges Mts. in the e. and spurs from the Langers plateau in the w. Important manufactures are those of iron and steel (at Epinal and Bru), and embroidery and lace. During World War I there was intermittent fighting in this district from 1914-1918. Area, 2,303 sq. m.; p. 382,100.

Vosges Mountains separate the French departments of Meurthe-et-Moselle and Vosges from the territory of Alsace-Lorraine. Starting from Basel northward, they border

the left side of part of the Rhine valley, and throw off the rivers Saar and Moselle to the n. The highest point, Ballon de Guebwiller (about 4,680 ft.), is at the s. end. The Vosges valleys are specially noted for cattle, and the w. slopes are thickly forested.

Vote. See **Elections.**

Voting Trust. An agreement whereby a number of stockholders in a corporation place their stock in the hands of one or more persons with powers of attorney authorizing them to vote the stock at corporate elections, in order to enable them to control the policy of the corporation. This is often done where a corporation is in financial difficulties, and one or more men in whom the stockholders have confidence agree to manage it for a certain period on condition of being given control in this way. If the agreement is not for any illegal purpose, as to prevent competition, it may be sustained by the courts, but, in general, voting trusts are viewed with disfavor by the courts. The stockholders receive certificates representing their shares of stock.

Vow, an obligation voluntarily undertaken before God. Vows were practised by all nations of antiquity, and are frequently mentioned in the Old Testament. Though they were not encouraged by Jesus Christ, there are instances of vows among the early disciples. The Roman Catholic Church has systematized the taking of vows and their operation. Dispensation from minor vows may be obtained from a religious superior or bishop; but such vows as that of chastity or membership in a religious order may only be dispensed by the pope. A distinction is made between 'simple' and 'solemn' vows. Solemn vows are defined as those of poverty, obedience, and chastity, which admit the maker of them into the 'religious' state.

Vulcan (Lat. *Vulcanus*), in ancient Roman mythology the god of fire; identified with the Greek Hephaestus. His worship was said to date from the time of Romulus. His chief festival was on August 23d.

Vulcanizing and Vulcanite. See **Rubber.**

Vulcano. See **Lipari Islands.**

Vulgate, the authorized Latin version of the Bible, made by Jerome (383-405 A.D.). At its foundation lies a previous Latin version, the Old Latia, sometimes unwarrantably called the Itala, which probably came into existence at Carthage. In this, the Old Testament translation, embracing also the Apocrypha, was made from the Septuagint, while

the New Testament omitted three epistles (Hebrews, James, 2 Peter). About the year 382 Pope Damasus requested Jerome to prepare a revision of the New Testament. Jerome began with the gospels, which he emended with great caution and care (383), then passed on to the rest of the New Testament, which was executed with less thoroughness. Next he took in hand the Old Testament. Of the Psalms he had made two revisions, called the Roman and Gallican respectively, the latter of which still stands in the Vulgate. By the 6th century this version was officially recognized by Gregory the Great. Attempts to find out Jerome's actual text began to be made—e.g. by Alcuin (c. 801), Theodulf, bishop of Orleans (c. 800), Lanfranc (c. 1070), Stephen Harding (c. 1150); finally R. Stephens was able to issue (1528) a fairly valuable critical edition. The Council of Trent (1546) having declared Jerome's work to be authentic (probably, that is, authoritative and accurate) and made an injunction as to correct printing, Hentenius of Louvain (1547) brought forth his beautiful folio edition. There was as yet, however, no real uniformity, and it was not till 1590 (Pope Sixtus v.) that a fully authorized edition appeared. Even this gave place in 1592 to the issue made under Clement viii., which as revised in 1598, became the definitive Roman Catholic edition. The differences between the Vulgate and the English Bible, apart from variations in rendering, are confined mainly to the order in which the books appear, the chapter divisions, and the presence or absence of the Apocrypha; and these only relate to the Old Testament.

Vulpecula, a small constellation to the s. of Cygnus in a dense part of the Milky Way, formed by Hevelius (d. 1687), and formerly called Vulpecula et Anser. The wonderful 'dumb-bell' nebula, Messier 27, belongs to this constellation.

Vulture, a name applied to the members of two families of birds of prey—the American Cathartidae and the Old World Vulturidae. In both families the bill is strong and hooked, and the head and neck almost entirely bare of feathers; the legs are strong, but the feet and claws are somewhat weak, in consequence of which the birds cannot carry off their food as the eagles can. Vultures sometimes reach a great size, this being specially true of the American forms, and they have a powerful and sustained flight. The food consists of carrion, though the larger forms will attack feeble or disabled

animals. The sight is exceedingly keen.

Of the Cathartidae, the most familiar example is the Turkey Buzzard (*Cathartes aura*) common in tropical and temperate America. Other Cathartidae are the South America Condor and the Black Vulture, sometimes called the Carrion Crow, seen as far north as Carolina. Of the Old World Vulturidae, examples are the Black Vulture (*Vultur monachus*) of the Mediterranean region; the Griffon Vulture (*Gyps fulvus*) of Southern Europe, seen also in Northern Africa and Central Asia; and the small Egyptian Vulture, or Pharaoh's Hen (*Neophron peronopterus*), which is so frequent a feature of Egyptian hieroglyphics. This last is raven-like in appearance, and has a very varied diet. It measures only two ft. in length as against the three and a half ft. of the griffon vulture. Consult Evans' *Birds*; Coues' *Birds of the Northwest*.

Vyatka (Kirov), is the capital of Vyatka province in the U.S.S.R., on the Vyatka River; nearly 200 m. n. of Kazan. It is a river port and episcopal see, with a splendid cathedral (1683), and remains of an ancient citadel and ramparts. It has manufactures of tobacco, glue, soap, paper, candles and tapers, leather, silver and copper articles, and ecclesiastical art objects. It was founded from Old Novgorod about 1180-1, and is still called Nougard by Tartars and Cheremisians; p. 62,097.

Vyazma, tn., Western Area, RSFSR, Smolensk province, 90 m. n.e. of Smolensk. It has a sixteenth century cathedral. Industries include tanning and the manufacture of leather goods, tobacco, and gingerbread, this last famous throughout Russia; p. 31,200.

Vyernii, or **Vyernyi**, now **Alma-Ata**, tn., Central Asia, capital of Kazakstan RSFSR, 382 m. n.e. of Tashkend, at the northern foot of Trans-Iliian Ala-tau, 2,405 ft. above sea-level. It has a cathedral, a school of horticulture, and a Mohammedan college. There is considerable trade, and cattle-breeding and bee-keeping are carried on. Vyernii is famous for its Nestorian inscriptions (from 8th century). Earthquakes are frequent; an especially severe one occurred in 1887; p. 41,600.

Vyshnii-Volochok, tn., Central Russia, in the government of Tver, 68 m. n.w. of Tver city. The Vyshnii-Volochok system is one of the three canal systems uniting the Baltic and Caspian basins. It was constructed by Peter the Great (1703-9). The city manufactures cotton goods; p. 17,500.

W, the twenty-third letter of the English alphabet. The English *w* is closely related to the vowel *u*, and may be termed consonantal *u*. It is probable that Latin *V* or *U*, which were formerly undistinguished, had this value after *Q*. *W* is simply *V* written twice.

Wabash River, the largest northern tributary of the Ohio River, rises in Northwestern Ohio, and flows to its junction with the Ohio, near Shawneetown, Ill. Its drainage area is 33,725 sq. m., and its total length 550 m.

WACS, Women's Army Corps, in World War II.

Wadi, Wady, or Donga, an African term for a river-course which is only temporarily filled with running water.

Wagner, Robert Ferdinand (1877-1953), politician, born in Germany and for years identified with N. Y. politics. He was elected to the U. S. Senate in 1926, 1932 and 1938. As a Senator he has been prominent as a sponsor of New Deal measures, including the National Labor Relations Act, which the U. S. Supreme Court declared unconstitutional; the Fair Labor Standards Act; and the National Labor Relations Act, the passage of which was followed by the sit-down strikes of 1936-37.

Wagner, Siegfried (1869-1930), German musical conductor and composer, son of Richard. In 1893 he entered upon his career as orchestra conductor and in 1896 became co-director of the Wagnerian Festival Playhouse in Bayreuth. In 1924 he assumed general direction of the festival and playhouse. Among his works are the operas *Der Bärenhäuter* (1899); *Banadietrich* (1910); *Sonnenflammen* (1918); and *Der Friedensengel* (1926).

Wagner, Wilhelm Richard (1813-83), German musical composer and poet, was born in Leipzig. From 1833 to 1839 he held appointments as conductor in Würzburg, Magdeburg, Königsberg, and Riga, and during this period composed among other works the operas *Die Feen*, *Das Liebesverbot*, and *Acts 1 and 2 of Rienzi*. In 1839 he proceeded to Paris. Here he finished the music to *Rienzi* and composed his *Faust* overture and *The Flying Dutchman*. In 1842 he left Paris for Dresden,

where he had secured the acceptance of *Rienzi*. The successful production of this work was followed a few months later by that of *The Flying Dutchman*, and soon afterwards he received the appointment of musical director. While in Dresden he composed *Tannhäuser* in 1848; produced by Liszt in Weimar, 1850). In 1855 he acted as conductor at the London Philharmonic Society's concerts. He finished (1867) the *Meistersinger* (a serio-comic opera) and *Siegfried* (1869). In 1872 he settled finally in Bayreuth, where in 1876, in a theatre built expressly for the production of his operas, the *Nibelungen Ring*, including *Das Rheingold*, *Die Walküre*, *Siegfried* and *Götterdämmerung*, was first performed. *Parzifal* (1882) was his greatest work.

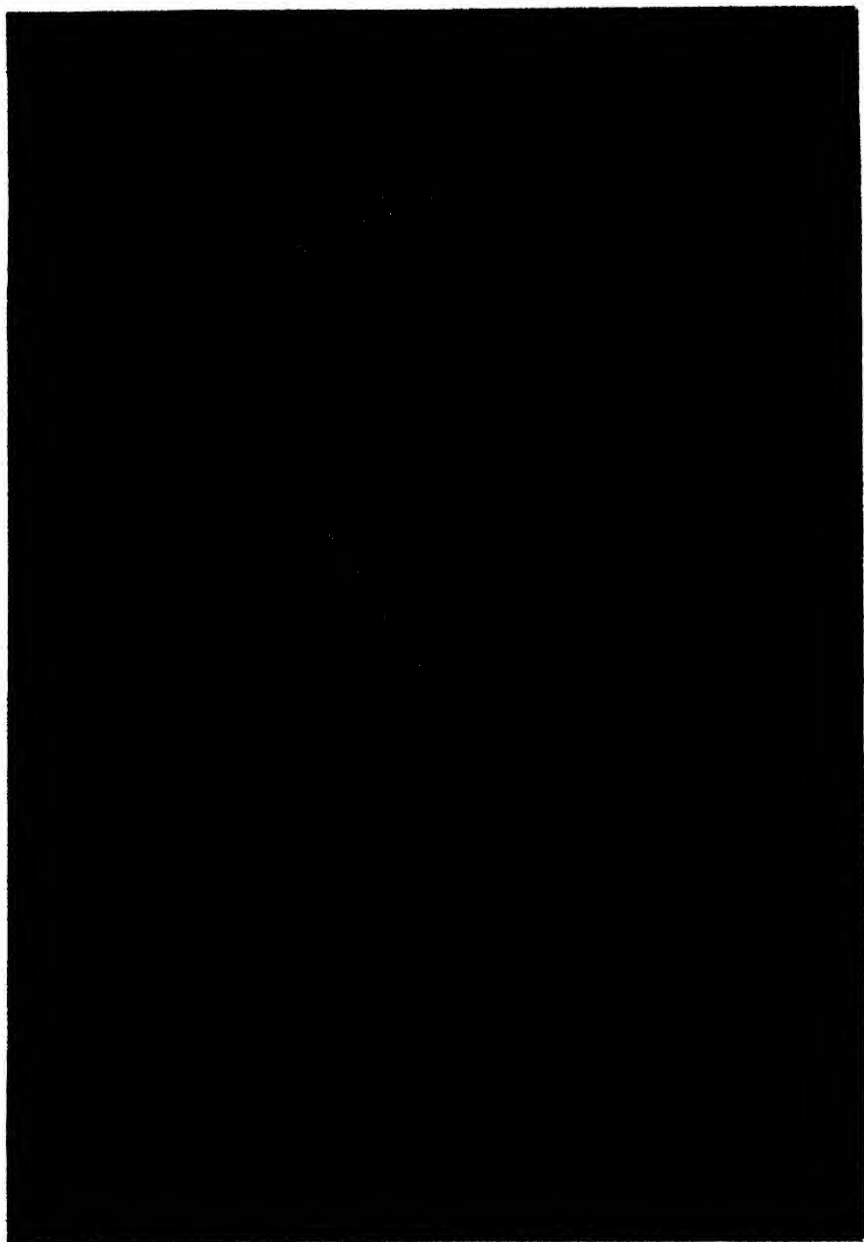
Wainwright, Jonathan M. (1883-1953), General U. S. Army, was educated at U. S. Military Academy. He was Lieut. General Field Commander for Gen. MacArthur on Bataan in 1942 and Commander-in-Chief after MacArthur's evacuation; he was forced to surrender to the Japanese in May 1942; was rescued from prison camp in August 1945; he accepted the surrender of Japanese armies in the Philippines in Sept. He was made a 4-star general and awarded the Distinguished Service Cross and Congressional Medal of Honor. Com. 4th Army 1946; retired 1947.

Wailing Wall, Jewish holy place in Jerusalem, reported to be the last remnant of Solomon's Temple. Traditionally the property of the Moslems, it was the scene of bitter riots between Moslem and Jew until 1931 when a League of Nations commission affirmed the Moslem title but assured the right of the Jewish worshippers to congregate before it.

Waite, Morrison Remick (1816-88), American jurist, born at Lyme, Conn. He was appointed chief justice of the U. S. to succeed Chase, in which position he served until his death.

Waits, English street musicians, now heard only at Christmastide.

Waiver. A person may, by express words, waive or abandon his legal rights, or he may be



GEORGE WASHINGTON

From a painting by Gilbert Stuart in the Metropolitan Museum of Art
This portrait was painted at Philadelphia in 1795, and it is believed that
the president sat for it. Many of the Stuart paintings of Washington
were painted from studies.

held to have done so by his conduct. But a man must know what his rights are before he can be held to have waived them. See ESTOPPEL; EQUITY.

Wake, a festival formerly held in parishes on the anniversary of the dedication of a church to some saint, attended by merriment, and generally fallen into disuse. A similar watching over a dead body, termed 'lyke' or 'lych-wake,' once common in the Highlands of Scotland and in Ireland, and practised by the Irish in America, also is passing away as a custom.

Wakefield, municipal and parliamentary borough and city, W. Riding, Yorkshire, England, on the Calder, 9 m. s.e. of Leeds. The cathedral is mainly 15th century. On a bridge over the Calder is a chapel founded by Edward IV. Manufactures include worsted yarn and cocoa-matting. The battle of Wakefield was fought in 1460, when the Yorkists were defeated by the Lancastrians; p. 59, 115.

Wake Island, a small coral formation in the Pacific Ocean, belonging to the United States; about 2,000 m. w. of Honolulu and 1,300 m. e. of Guam; is almost in a direct line between those places, and is in the track of vessels sailing from the United States and Hawaii to China and the Philippines. It was discovered in 1796 and formally occupied July 4, 1898, and it is valued chiefly as a cable and air station. It was captured by Japan, 1941; re-occupied by U. S., 1945.

Wake-Robin, a popular name in England for *Arum maculatum*, the cuckoo-pint. (See ARUM.) In America, a name for Trillium.

Walachia, or **Wallachia**, a former principality of Europe, united in 1861 with Moldavia to form the kingdom of Roumania.

Walcheren, island, Zeeland province, Holland, between mouths of E. and W. Scheldt, covers an area of 52,000 acres.

Wald, Lillian (1867-1940), American social worker, founder of the Henry Street Settlement, New York City. Author: *The House on Henry Street*.

Waldemar I., the Great (1131-82), king of Denmark (1157). Aided by his great minister, Archbishop Absalon, he raised his kingdom to a high degree of prosperity.

Waldemar II., the Conqueror (1170-1241), king of Denmark, youngest son of Waldemar the Great, ascended the throne in 1202. His attempts to reduce Sweden and Norway were unsuccessful; but in Germany he acquired Holstein and Mecklenburg, and in 1219 undertook a crusade against the Esthoni-ans, whom he routed at the Battle of Arvel.

Waldemar IV., called Atterdag (d. 1375), king of Denmark, succeeded to the throne in

1340. He sold Esthonia in 1346 to the Teutonic Order, and in 1360 he succeeded in regaining Scania, Halland, and Blekinge from the Swedish king. In 1361 he conquered Gotland, returning to Denmark with the incalculable treasures of Wisby; but this expedition involved him in two ruinous wars with the Hanseatic League and their allies, Sweden and Mecklenburg, during the second of which (1369) his enemies burnt Copenhagen. Peace was finally made at Stralsund (1370).

Waldenses, or **Vaudois**, a religious community, whose foundation is to be attributed to Peter Waldo or Valdez, a wealthy merchant of Lyons, who in 1170 renounced his possessions and began to wander about as a preacher of voluntary poverty. After a time the followers of Peter Waldo, known as the 'poor men of Lyons,' established themselves in the valleys of the Cottian Alps, in the valleys of La Pellice, Angrogna, and Chisone, and also in those of Provence and Dauphiné. Pope Lucius III. excommunicated them in 1184, and Pope Innocent III. in 1215, and many perished in the persecution of the Albigenses (1209-29). Nevertheless they continued to increase, and carried their practice and profession all over the s. of France, and far into the w. and s. of Germany. A war of extermination was begun against them by the Duchess of Savoy in 1475, and in 1487 Pope Innocent VIII. proclaimed a regular crusade against them. Nevertheless they stubbornly held their ground, and in 1561 extorted from the Duke of Savoy the right to freedom of worship in certain of the Piedmontese valleys. In the following century, however, they suffered fearfully—first from a plague, which in 1630-1 carried off nearly one-half of them; secondly, from the French troops, aided by the Irish Brigade, who in 1655 inflicted upon them such barbarities that the religious consciousness of Europe was aroused and Cromwell intervened, while Milton thundered against their persecutors; and thirdly, from the Duke of Savoy, who in 1686 attempted their forcible conversion to Roman Catholicism, and exiled to Geneva those who proved obdurate. Three years later, however, a heroic band, pining for their native valleys, forced their way back to them under the leadership of their pastor, Henri Arnaud, and successfully withstood the French and Savoyard attempts to crush, convert, or remove them.

Waldstein, Charles (1856-1927), American archaeologist, born in New York City. In 1880 he was appointed lecturer in classical archaeology in the University of Cambridge, England. He had charge of the American Archaeological Institute's excavating operations at Plataea,

Eretria, the Heraion of Argos, and other places. In 1906 he was appointed to superintend the vast work of excavating Herculaneum. His works include: *Essays on the Art of Phidias* (1885); and *Greek Sculpture and Modern Art* (1914).

Wales. *Geography.*—See ENGLAND AND WALES.



Historic Castles in Wales.

Upper, Carnarvon; Lower, Conway.

History.—The earliest inhabitants of Wales, who are still largely represented in the present population, especially in S. E. Wales, were probably dark, short, and dolichocephalic. In the Bronze Period these were conquered by a tall, fair, and brachycephalic race, which spoke the parent speech of the Goidelic varieties of the Celtic Indo-European tongue. About a century and a half before our era a powerful army of later Celts from Belgic Gaul, armed with iron weapons and chariots, invaded Britain, and introduced the typical Late Celtic civilization and art. The Romans conquered Wales and after the firm establishment of Roman rule, in the 1st century A.D., Wales appears to have given the Romans little trouble.

In the 5th century A.D. Cunedda Wledig, from the neighborhood of Edinburgh, settled in Wales, probably by the invitation of the Welsh chieftains, in order to repel the Irish piratical invaders, and it is from his stock that most of the subsequent rulers of Wales were descended. In 577, by their defeat at Deor-

ham, near Bath, the Welsh were divided from their kinsmen of S. W. Britain; and about 613, by their defeat at Chester, they were separated from the men of Cumbria and Strathclyde. The Normans first appeared in Wales, in Glamorganshire, in 1072. It was the support given by the Welsh princes to the barons that led Edward I. to make a complete conquest of the principality of Wales, thereby consolidating the power of the crown. Edward rendered his conquest of Wales effective by means of a series of magnificent castles, notably those of Conway, Carnarvon, and Harlech. In the wars of the Roses Welshmen played a prominent part on both sides. East Wales was mainly Yorkist, and the west Lancastrian. Finally, after some hesitation, Wales rallied round the Earl of Richmond. Henry VII. took steps to place the boroughs of Wales and the county districts on the same footing by placing them all under English law. Moreover, the institution of the Court of the Star Chamber made the administration of justice a reality. After the accession of Henry VII. the Welsh became devoted adherents of the British crown, and continued so even during the civil war.

Literature.—With a few important exceptions, the chief original works of Welsh literature are in poetry, and these are often of striking excellence. The oldest specimen of Welsh poetry is a series of stanzas from two different poems in the Juvencus Codex of the University Library, Cambridge, belonging to the 9th century. The *Book of Aneirin* (early 13th century) has preserved in parts the orthography of the MS. from which it was copied, and gives us specimens of poetry which may well belong to the 8th or 9th century. There are poems of the same cycle in the *Book of Taliessin* (14th century). In the *Book of Taliessin*, and sporadically in other books, there is a great deal of poetry which reflects the monastic studies of the early middle ages and the ideas of poetry then prevalent. From 1100-1300 Welsh poetry is represented mainly by the compositions of the court poets, Meilir, Gwalchmai, Cynddelw, Dafydd Benfras, Llywarch ab Llywelyn, Gruffydd ab yr Ynad Coch, and others. These poems exhibit great vigor and terseness of expression, and highly developed technical skill. Dafydd ab Gwilym developed love poetry to a very high degree of perfection. Tudur Aled was the last pre-Reformation poet of distinction. His chief successor in the Tudor period was William Lleyn. During the civil war and the period of the commonwealth the leading poet was Hugh Morris, a writer of love poetry. Towards the

middle of the 18th century a great revival of Welsh poetry took place through the efforts of writers of great poetic gifts, such as Goronwy Owen. The Welsh language is especially rich in hymns of striking beauty, written by Williams of Pantycelyn (author of *Guide me, O Thou great Jehovah*) and others. The whole Bible was translated into Welsh from Hebrew and Greek in 1588 by Dr. Morgan, bishop of St. Asaph. One of the most remarkable Welsh books of the 17th century is *Llyfr y Tri Aderyn* ('Book of the Three Birds'), by Morgan Lloyd, a prominent Welsh Puritan and follower of Jacob Böhme. The chief development of Welsh prose has been in the 19th century, when a large number of excellent works on theology, biography, general literature, politics, as well as works of fiction, were published.

Wales, Prince of, the title borne by the eldest son and heir-apparent of the reigning sovereign of England since the conquest of Wales by Edward I. The title was first bestowed upon an English prince in the person of Edward (II.) in 1301, and has been regularly borne by the eldest son of the sovereign since it was granted to Edward the Black Prince. It is not, however, hereditary, but is in each case a fresh creation. The distinguishing badge of the Prince of Wales is the plume of three ostrich feathers, with the motto *Ich dien*.

Walker, William (1824-60), American filibuster, was born in Nashville, Tenn. In 1853 he led an expedition of about 170 men, with three cannon, to Lower California; declared himself president of the 'Pacific Republic'; and early in 1854 attempted the conquest of Sonora, but was defeated, and surrendered to the United States authorities at San Diego. He then led a band of 62 adventurers to Nicaragua, and succeeded in capturing the town of Granada. He forced General Corral, the President, to make him secretary of war and commander-in-chief, and afterwards had Corral arrested, on a charge of conspiracy, and shot. He was elected president, and proceeded to annul the laws against slavery. A rebellion, which was aided by the neighboring states, soon broke out against his authority, and he was forced, after several defeats, to take refuge, on the United States sloop-of-war *St. Mary*. Walker set about equipping a new expedition, and in October, 1858, was captured by United States authorities at the mouth of the Mississippi. He was tried at New Orleans, but the jury refused to convict him. With money furnished by friends of slavery extension, he once more got together an expe-

dition, landed at Trujillo, Honduras, and issued a proclamation against the government; but he was forced, on September 3, 1860, to surrender to the commander of the British warship *Icarus*. He was then turned over to Honduras, where he was tried by a court-martial, was convicted, and shot.

Walking, Long-Distance, a form of athletic sport more commonly indulged in as a means of recreation in Europe than in America. Among well known long-distance walkers are Edward Weston, O'Leary, Ward, and Miss Eleanor Sears of Boston, who in 1928 set a new record in long distance walking when she hiked from Newport to Boston, a distance of 74 m. in 17 1/4 hours. Her average time was 4.4 m. an hour. Walking clubs have long existed in European countries, the Alps, the Tyrol, the English lakes and the Black Forest being particularly favored localities. America has followed the European example, and there are to-day many walking clubs in the United States, the greater number being in New Eng-



Photo by Frith.

Wallace Monument, Stirling.

land and on the Pacific Coast. Among these are the Appalachian Mountain Club, founded in Boston in 1876; the Green Mountain Club of Vermont, founded in 1910; the Fresh Air

Club of New York; the Wanderlust of Philadelphia; the Prairie Club of Chicago; and the Sierra Club of San Francisco.

Walking-stick Insects, or Stick Insects, are, like the leaf insects, orthopterous insects belonging to the family Phasmidae. They have slender, greatly elongated bodies, much like a stick, with legs resembling twigs. Wings may be absent, or when present, are leaf-like.

Wall, Great, of China, the largest defense structure in the world, forming a part of the northern boundary of China, and dividing it from Mongolia, stretches from the Yellow Sea to the Yellow River. It was erected as a barrier against the barbarian tribes to the n. and w., and a part of it dates back as far as 469 B.C. The Emperor Chin the First (246-210 B.C.) united and strengthened the already existing walls, and in the 14th and 15th centuries the whole structure was repaired and added to. The Great Wall proper is over 2,000 m. long, and its branches and loops consist of over 1,700 additional m. Its height is not uniform, varying from 20 to 50 ft., with an average of 22 ft. Towers from 40 to 60 ft. high, formerly used as sentry stations, occur at intervals of some 600 ft. In some places the structure is of earth, in others of brick or stone.

Wallace, Alfred Russel (1823-1913), English scientist. He accompanied H. W. Bates, the naturalist, on a trip to the Amazon in 1848, and in 1854 visited the Malay archipelago, where he spent eight years in travel and study. While in the East, Wallace, quite independently of Darwin, thought out a theory practically identical with the theory of natural selection. Wallace's views are set forth in *Contributions to the Theory of Natural Selection* (1870), and in *Darwinism* (1889).

Wallace, Henry Agard (1888-), was born in Iowa, the son of Henry C. Wallace; studied at Iowa State Agric. College. He was editor of *Wallace's Farmer* and *Iowa Homestead*, 1924-29. He was Secy. of Agriculture in the F. D. Roosevelt cabinet, 1933-40; was an outstanding New Dealer, handling cotton and wheat control, soil conservation and reclamation of the mid-West 'dust bowl.' In 1938 he undertook to have European nations join the U. S. in fixing world prices for wheat. He was elected Vice-President, 1940; served as Chairman of Economic Defense Board, Supply Priorities Board and Office of Export Control. In 1943 he made an extended tour in S. America, in the interest of securing cooperative war efforts; in 1944 in China, where he urged friendship with Russia. In the 1944 convention he lost the renomination for V. President, but in

1945 was appointed Secy. of Commerce by Pres. Roosevelt; retained by Pres. Truman until 1946. In 1945 wrote *Sixty Million Jobs*.

Wallace, Henry Cantwell (1866-1924), American cabinet official, was born in Illinois. He was editor of the *Creamery Gazette* and *Farm and Dairy* (1893-5), associate editor and manager (1895-1916) and editor (1916-21) of *Wallace's Farmer*. Secy. of Agriculture under Presidents Harding and Coolidge.

Wallace, Lewis, popularly known as **Lew Wallace** (1827-1905), American soldier and author, was born in Indiana. He was mustered out of the volunteer service in the Civil War in 1865, and returned to his law practice at Crawfordsville, Ind. From 1878 to 1881 he was governor of New Mexico, and from 1881 to 1885 U. S. minister to Turkey.

Wallace began his work in fiction with *The Fair God*, a story of the conquest of Mexico (1873). His second romance, *Ben Hur, a Tale of the Christ* (1880), met with extraordinary success, was dramatized by William Young, and subsequently produced on the stage in 1899. Other works include *Life of Gen. Benjamin Harrison* (1888); *The Boyhood of Christ* (1889); *The Prince of India*, a romance (1893); *The Wooing of Malkatoon*, verse (1898); *Lew Wallace: An Autobiography* (2 vols. 1906).

Wallace, Sir William (?1272-1305), Scottish hero and patriot, son of Sir Malcolm Wallace, first stands out clearly in 1297, as organizer of Scottish resistance to Edward I. His achievements have been a favorite theme with Scottish poets.

Wallack, James William (c. 1795-1864), Anglo-American actor, was born in London. As a young man he acted at Drury Lane, where he supported Edmund Kean and other famous actors, and in 1818 he appeared as Macbeth in New York. He finally settled in the latter city about 1850. In 1852 he opened Wallack's Theatre at Broadway and Broome Street, and in 1861 the house at Broadway and Thirtieth Street.

Wallack, John Johnstone ('Lester' Wallack) (1820-88), American actor, son of James William Wallack, was born in New York City, during a visit of his parents to America. His first appearance in New York City was in *Used Up*, at the Broadway Theatre, in 1847. He appeared at various other New York theatres, and from 1852 to 1864 acted leading parts at his father's theatre, at the same time performing the duties of stage manager. On his father's death in 1864 he succeeded him as proprietor of Wallack's Theatre, and in 1882 he opened a new Wallack's Theatre at Broadway

and Thirtieth Street, New York (torn down in 1915). His *Memories of Fifty Years* was published in 1889.

Walla Walla, city, Washington, 119 m. s.w. of Spokane. The Walla Walla Valley is famous as a wheat and fruit-raising region, and live stock, oats, barley, early vegetables, and nuts are also raised. The most important manufactured products are threshing machines, flour, lumber, foundry products, leather, and confectionery. A military post was established on the site of Walla Walla about 1856, and the settlement which grew up around it was then called Steptoe City. Walla Walla is an Indian name and means 'many waters'; p. 24,102.

Wallawalla Indians, a tribe of Shahapian Indians formerly found on the Walla Walla River and on the east bank of the Columbia from Snake River up to the Umatilla in Washington and Oregon. In 1855 they were removed to the Umatilla reservation in Oregon, where they are now found to the number of about 400.

Wallenstein, or **Waldstein**, **Albrecht Wenzel Eusebius von**, Duke of Friedland (1583-1634), imperialist general in the Thirty Years War, was born at Hermanic in Bohemia. In 1625 the object of Wallenstein was the restoration of the imperial power and the formation of a vast centralized Hapsburg empire, which should include all Germany, and should dominate the Baltic. Although successful at first, he finally failed, partly through jealousies of his princes, and on Feb. 24, 1634, he was assassinated by some Irish and Scottish officers.

Waller, **Edmund** (1606-87), English poet, was born in Coleshill, Buckinghamshire. In 1643 he was appointed one of the commissioners to treat with King Charles, then at Oxford; he was implicated in a plot ('Waller's plot') to hold London for the king, and was fined £10,000 and exiled (November, 1644). His reputation rests chiefly on his lyrics, such as *Go, Lovely Rose*, and *On A Girdle*.

Walloons, the inhabitants of south-east Belgium. They are Celts, direct descendants of the Gaulish Belgæ. The Walloons—'Welsh' or 'Foreigners'—are physically distinguished from the Flemings by their darker color, taller stature, stronger and more angular frames. The Walloon language is a North French dialect, independently developed, but showing marked affinities to the *patois* of Picardy and Lorraine.

Wall Paper, colored paper that is pasted on the walls of rooms as a decorative hanging. It appears to have been introduced into Europe from China by the Dutch about the middle of

the 16th century. In 1688, according to Lafond, an engraved block was substituted by the French engraver, Papillon, for the stencil previously employed. Until 1830 wall paper continued to be made in small sheets. About the middle of the 19th century the development of the modern printing machine facilitated the production of 'endless paper.'

According to Miss Sanborn, Charles Hargreave advertised wall paper for sale in Philadelphia in 1745, and a little later Peter Flesoon manufactured paper hangings at the corner of Fourth and Chestnut streets, while paper hanging in New York and Albany was an important business by 1750, and the walls of the better houses were papered.

The principal varieties of paper are: *blanks*, printed on unprepared paper and cheapest of all; *ingrains*, solid color with rough surface; *tints or grounds*, tinted without pattern; *bur-laps*, *satins*, *damasks*, *tapestries*—imitations of the fabrics; *gilt or bronzes*, metal effects produced with gold or bronze powder; *miccas*, grounds made iridescent with mica dust; *flocks or velvets*, with nap surface produced by the application of fine powdered wool shearings; *silk flocks*, where silk takes the place of wool; *sanitary or oil papers*, printed in oil or varnished and washable; *pressed papers*, embossed into low relief; *veneers* (mostly Japanese), wood veneer on paper back; *grass cloth* (Japanese), woven grass face on paper back.

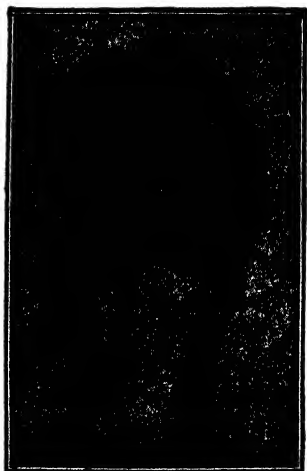
Wallsend, municipal borough, Northumberland, England, marks the termination of the Roman wall. It is a shipbuilding and manufacturing center. Coal is produced; p. 44,582.

Wall Street, a narrow street near the southern end of Manhattan Island, New York City, extending for about half a mile from Broadway, opposite Trinity (Protestant Episcopal) Church, to the East River, the centre of the financial district of New York City. It took its name from its following the line of the wall built by the Dutch along the northern boundary of the ancient village of Manhattan. It has been used as synonymous with New York Stock Exchange.

Walnut, a tree of the genus *Juglans*, although the term is generally restricted to the European or 'English' species (*J. regia*) and to the American Black Walnut (*J. nigra*). The White Walnut (*J. cinerea*) is usually called 'butternut.' The heart-wood of black walnut, formerly much used for furniture and house fitting, is light and strong, and golden brown in color, darkening with age.

Walpole, **Horace**, fourth Earl of Orford (1717-97), English author, was born in Lon-

don, the youngest child of Sir Robert Walpole. An ample fortune enabled him to indulge his sociable and antiquarian tastes, and in 1747 he bought the villa of Strawberry



Horace Walpole

Hill, near Twickenham on the Thames, whose adornment became thenceforth the hobby of his life. In 1764 he published *The Castle of Otranto*, which helped to inaugurate a school of romance. His antiquarian works show acuteness and diligence of research. In easy, playful wit, racy description and anecdote, variety of topic, and lightness of touch, no letter writer—unless it be Madame de Sévigné—has surpassed him.

Walpole, Hugh Seymour (1884-1941), English novelist, was born in New Zealand. His works include *Fortitude* (1913); *The Duchess of Wrexhe* (1914); *The Green Mirror* (1918); *Jeremy* (1919); *The Cathedral* (1922); *Portrait of a Man with Red Hair* (1925); *The Fortress* (1932); *Vanessa* (1933); *Roman Fountain* (1940).

Walpole, Sir Robert (1676-1745). **First Earl of Orford**, English statesman, was born in Houghton, Norfolk. He held various offices, being twice expelled from Parliament, and having once resigned from a cabinet office. In 1721 he was made lord of the treasury a second time and chancellor of the exchequer, becoming virtually supreme in the government—a position which he held for twenty-one years. George II. was a difficult king to manage, but, thanks to Walpole's tactful influence with the queen, difficulties were smoothed over, and the king's speech enunciating the principles of free trade in the fiscal government of the na-

tion formed the basis of all Walpole's fiscal measures. His fall was due to his inability to restrain the popular feeling over the war with Spain and he resigned on Feb. 2, 1742. Walpole's great task lay in gradually reconciling the reluctant nation to the new dynasty. He scrupled at no method of carrying out his policy. He did not hesitate to stoop to parliamentary corruption, if by that means he could increase the power of the Whigs and reduce the friction between the throne and the people.

Walpurga, Walburga or Walpurgis, German saint, sister of Willibald, who formed one of the mission to Germany under St. Boniface, was born in Sussex, England. She went to Germany about 750 and in 761 became abbess of Heidenheim. Several days have been celebrated in her honor, August 4, February 25, and May 1, but the last named without any apparent reason, has come to be known as 'Walpurgis night' on which the witches are said to hold revel on the Harz Mountains.

Walrus, or Morse (*Trichechus rosmarus*), a large animal related to the eared seals, but constituting a special family, the Trichechidae.



Robert Walpole
(Portrait by Kneller)

It is confined to the Arctic regions. The walrus is a clumsy animal, reaching a length of twelve feet and a weight of 3,000 lbs. As in the eared

seals, the hind limbs are capable of being turned forward to support the weight of the body. External ears are totally absent, however—a point of distinction from the eared seals—and the canines of the upper jaw are greatly enlarged to form the conspicuous projecting tusks. The muzzle is divided into two parts by a groove between the nostrils, and the upper lip is furnished at each side with a num-



Walrus.

ber of conspicuous bristles; otherwise there is practically no hair on the body. The tail is small. The tusks of the adult are useful primarily for digging up the bivalve mollusca on which the walrus feeds; but they also assist the animal to climb upon the ice, and to clamber about the surface of the rocky islands which it haunts. The other teeth have low blunt crowns, adapted to crushing the shells of mollusca. The young walrus is covered with short brownish fur, but this is rubbed off with advancing years, and very old males may be practically naked.

Walruses are usually found in the vicinity either of land or of floating ice. They are markedly social, and, except at the breeding season or when attacked, are gentle and inoffensive. It would appear that the females breed only once in three years; they are singularly devoted to their young, which they suckle for two years. Walruses are hunted for the sake of their oil, and for their hides and the ivory of the tusks.

Walsh, David Ignatius (1872-1947), U. S. Senator, was born in Leominster, Mass., and admitted to the bar in 1897. As member of the Massachusetts House he was the author of laws which regulated employment of labor on public works in Massachusetts. He served as lieutenant governor, governor, and was U. S. Senator, 1919-25, and again in 1926, and was reelected in 1928, 1934, 1940.

Walsh, Mrs. Richard J. See **Buck, Pearl**.

Walsingham, Sir Francis (c. 1536-90), English statesman. Elizabeth made him a secretary of state. In Mary Queen of Scots he saw a dangerous enemy to the English throne, and managed to intercept her letters, copying them and sending them on to their destination,

and treating the replies in the same fashion. He was one of the commission appointed to try Queen Mary at Fotheringay. Walsingham belonged to the Puritan party.

Waltham, city, Massachusetts, 10 m. w. of Boston. In Waltham, about 1814, were established the first complete cotton mills in the United States, of which the Lowell Mills were an extension. The chief industry to-day is watch-making, one of the largest watch factories in the world being located here. Other manufactured products are numerous; p. 47, 187.

Waltham Abbey, or **Waltham Holy Cross**, town, England, 12 m. n. of London. It has the remains of an abbey said to have been founded by King Harold; p. 7, 116.

Walton, Izaak (1593-1683), English biographer and writer on angling, was born at Staf-ford, and became an ironmonger in Fleet Street, London. He had many literary acquaintances, among whom were Ben Jonson, Michael Drayton, and Sir Henry Wotton, and was himself given to versifying as well as to the citizen's sport of angling. In 1653 he published *The Compleat Angler*, which has gone through many editions. The discourse is interspersed with dialogue, quaint verses, songs, and idyllic glimpses of country life, and the whole breathes such cheerful contentment, such sweet freshness, as to give the book a charm altogether its own.

Waltz, a German dance, which first became fashionable in other countries in the early part of the 19th century.

Wambaugh, Sarah (1882-), American economist, political scientist. Member of the Administrative Commissions and Minorities Section of the League of Nations Secretariat; advisor to Government of Peru, 1925-26; advisor to the League of Nations Governing Commission in Saar plebiscite, 1934-35; on Commission to Greece, 1947.

Wampum, a kind of currency among the North American Indians, especially among tribes of Algonquian stock. Long cylindrical beads made of white shell were the usual form of this medium of exchange; purple shell was regarded as of greater value than the white.

Wanamaker, John (1838-1922), American merchant, born in Philadelphia. After a common-school education he was employed as an errand boy. After working several years as a salesman, he established in Philadelphia the clothing house of Wanamaker & Brown in 1861. In 1876 he founded his well-known department store in the same city, and in 1896 the branch house in New York City. He was U. S. postmaster-general in Harrison's cabinet from 1889 to 1893. During the Civil War he

was an organizer of the Christian Commission and he was president of the Y. M. C. A. of Philadelphia from 1870 to 1883.

Wapiti (*Cervus canadensis*), a North American deer, popularly called elk in western N. America. The antlers are greatly developed. The height at the shoulder is about five and a half feet in a full-grown stag, which may weigh as much as a thousand pounds. This magnificent deer was numerous, at the time of the exploration of the interior of N. America, from the Alleghenies westward to the mountains of California and British Columbia. About 1880 it began to be destroyed in vast numbers on the plains, and now few are to be had, even in the Rocky Mountains, except about Yellowstone Park and northwestward.

War, a conflict between states or nations, conducted by armed forces on land, on sea, or in air. The considerations which determine the actual operations of war, and the methods by which these are carried out, belong to the provinces of strategy and tactics. Civil war is that carried on by factions under one government.

War Debts Owed to the United States, January, 1947, from World War I.

The total amount of the war debts of fifteen nations to the United States as originally funded amounted to \$11,565,093,885. This did not include the sum of \$478,561,537 representing the original German debt to the United States for mixed claims and the cost of the army of occupation. According to the debt-funding agreements concluded by the United States with each of its former Allies, the \$10,338,058,352 borrowed from that country during and immediately after the war by European governments was to be repaid in instalments over a period of sixty-two years. Interest charges at varying rates brought the total amount of the debt payments due to more than \$22,000,000,000. While the various agreements were concluded on somewhat different terms, the annual payments of the foreign governments increased, according to schedule, from \$210,500,000 in 1929 to a maximum of \$415,400,000 in 1938.

Proposals and suggestions to cancel the debts had been circulated since World War I supported by statesmen and publicists of those nations indebted to the United States. Even in the latter country not a few prominent persons advocated cancellation. Cogent arguments were advanced on both sides of the controversy. On the one hand, the impoverished condition of Europe and the uphill struggle of its inhabitants were held to be valid reasons why those debts should be cancelled, that the

debtors might keep the money at home for reconstruction and industrial development. Another favorite argument was, that the United States was a co-belligerent, an ally in the conflict, and that therefore, as each separate national entity had contributed to ultimate victory, all expenses should have been pooled for the common cause.

On the other hand, in the United States the weight of opinion ran diametrically opposite to this argument. There, it was widely held that the starting of the World War was the outcome of a quarrel purely European, in which the United States had no part, yet was eventually drawn into the conflict by circumstances which made participation inevitable. On numerous occasions American political spokesmen had most emphatically declared their opposition to cancellation. Great Britain had expressed readiness to cancel the obligations of all her debtors provided the United States cancelled the debt owing by Great Britain.

According to an estimate issued in December, 1931, by Professor John M. Clark of Columbia University, the tangible cost of the World War I to the United States, if the War debts were not collected, would be increased from fifty-two to ninety billion dollars.

Regular payments were made on all war debts to the United States in accordance with the funding agreements through and including the semi-annual payment of June 15, 1931. By this date the total amount received aggregated \$2,627,580,000, or about one-quarter of the original sum advanced. Of this amount, \$725,300,000 represented repayment of principal and \$1,902,280,000 interest payments. Most of it was applied to the reduction of the national debt. The payments were made as scheduled primarily because the large loans obtained by Germany in the United States enabled her to pay reparations to the Allied countries, which passed the reparations on to the United States in the form of war debt payments. This situation ended following the collapse of the American stock market in October, 1929, the onset of the world depression, the closing of the American and other foreign loan markets, the rapid decline in governmental revenues everywhere, and finally the financial crisis in Europe in 1931.

To check the financial crisis, President Hoover on June 20, 1931, proposed 'the postponement during one year of all payments on intergovernmental debts, reparations, and relief debts, both principal and interest.' The proposal was immediately accepted by most of the debtor countries and finally by France. See REPARATIONS. The moratorium remained

in effect from July 1, 1931, to June 30, 1932. Agreements were made providing for the repayment of the suspended payments, with interest at 4 per cent., in 10 annual instalments totaling \$30,048,862 annually, commencing July 1, 1933.

It was expected that the moratorium would check the economic depression and stimulate world recovery. The depression not only continued during 1931-32, but tightened its grip upon Europe and the United States alike. In the joint resolution of Dec. 18, 1931, ratifying the Hoover Moratorium, the following statement of policy was inserted:

'Section 5. It is hereby expressly declared to be against the policy of Congress that any of the indebtedness of foreign countries to the United States be in any way cancelled or reduced, and nothing in this joint resolution shall be construed as indicating a contrary policy, or implying that favorable consideration will at any time be given to a change in policy hereby declared.'

The first outright default on American war loans occurred Nov. 10, 1932. At that time the U. S. was urged by European debtors to reconsider the entire debt-funding agreements. The British Government pointed out that the continuance of war debt payments would force the debtor nations to increase their export surpluses, thus reducing their purchases of goods in the creditor country and contributing to the forces of depression in that country. It held that the payments had been proved 'inconsistent with the present economic organization of the world' and that they would inevitably accentuate the gravity of the economic crisis. The French Government stressed the political aspect of the issue, declaring suspension the 'normal, equitable and necessary sequel' to the Hoover Moratorium of 1931 and the Hoover-Laval conversations.

At a conference between President Hoover and President-elect Roosevelt, November 22, 1932, at the White House, they concurred in rejecting the claim that war debts had been linked with reparations. Five nations went into default on Dec. 15, 1932, and six nations made their scheduled payments. The nations which paid were: Great Britain, Czechoslovakia, Italy, Finland, Latvia, and Lithuania. The nations defaulting were: France, Poland, Belgium, Estonia, and Hungary. Of total payments amounting to \$143,604,856 due June 15, 1933, the United States Government received only 8 per cent. Finland paid her installment in full. Six other nations made 'token' or part payments. The countries which defaulted completely were: France,

Belgium, Poland, Estonia, Yugoslavia, and Hungary.

In acknowledging the receipt of the 'token' payments, the United States Government in each case reiterated its willingness to review the entire debt question at Washington in the near future. The countries which defaulted entirely received no such assurance. Notes dispatched to them June 17 in response to their pleas for a review of the debt situation reminded them of their failure to comply with existing agreements. Five debtors defaulted completely as follows: France, Poland, Belgium, Estonia, and Hungary. Finland paid her installment in full, while other nations made 'token' payments. On May 10, 1934, the Department of State ruled that any 'token' payments in the future would constitute default.

In 1934, all European governments except Finland defaulted payments due June 15 and Dec. 15. The war debts totalled, July 1, 1941, \$13,725,450,285. Nations in default included Great Britain, Belgium, Czechoslovakia, Estonia, Finland, France, Hungary, Italy, Latvia, Lithuania, Poland, Rumania. Debts are due the U. S. from Nicaragua, Armenia and Russia. Finland paid on every due date except when she was at war with Russia. Then the U. S. authorized postponement of her payments from Jan. 1, 1941 to Dec. 31, 1942. In the year 1946 the debt reached a total of \$15,059,062,000; 1952, \$16,713,802,288.

War, Laws of. The general rules of law, as between belligerent nations, are based upon accepted international usage, and are to a large extent embodied in various treaties which have been made from time to time by the principal nations of the world, and are, therefore, a part of the general body of international law. These relate to the manner of conducting hostilities, treatment of prisoners, respect of flags of truce, contraband of war, etc. The legal effect of war upon the business relations of the citizens of the respective belligerent states varies somewhat in different nations. Generally, however, the following effects are recognized: All commercial relations entered into or carried on during a war by a citizen of one of the nations with a citizen of the other are invalid. This is on the ground that the commerce of the enemy should not be encouraged, and commercial transactions might result in benefit to the enemy, or lessen the patriotism of citizens engaging in it. Contractual relations existing at the commencement of the war between citizens of the belligerent nations are not necessarily abrogated, but are suspended during the war. Civil law prevails in all parts of a

country at war, until superseded by martial law, which is only declared or enforced when necessary to maintain order.

Warbler, a small bird of either of two families, the majority of which are warbling singers. All of both groups are of small size, migratory, and exclusively insectivorous, doing good service for the farmer and gardener by their capture of noxious worms and bugs.

Ward, Artemus. See **Browne, Charles Farrar**.

Ward, Mrs. Humphry (Mary Augusta Arnold) (1851-1920), English novelist, was born in Tasmania; grew up in Oxford. Her widely-read novel, *Robert Elsmere*, defended the higher criticism of the Bible. Among her novels were *Lady Rose's Daughter* (1903) and *The Case of Richard Meynell* (1911).

Ward, John Quincy Adams (1830-1910), American sculptor. In 1863 he finished his *Indian Hunter*, the first statue placed in Central Park, New York City. Among other noted works are *The Seventh Regiment Citizen Soldier*, *Shakespeare*, and *The Pilgrim*, all in Central Park; *The Freedman and Good Samaritan*, in Boston; the pediment of the New York Stock Exchange building; the statues of *Washington*, on the steps of the U. S. Sub-Treasury in Wall Street, and of *Horace Greeley*, in Herald Square, in New York City; of *Henry Ward Beecher*, in City Hall Park, Brooklyn; *Commodore Perry*, Newport, R. I.; *Israel Putnam*, Hartford, Conn.; and *General Thomas*, Washington, D. C., pronounced by St. Gaudens the finest equestrian statue in the world.

Ward, Lester Frank (1841-1913), American botanist, geologist, and sociologist, born in Joliet, Ill.

Warfield, David (1866-1951), Am. actor. He first played Irish characters, and then began a series of Jewish impersonations. In 1904 he created the part of Herr Anton von Barwig in Charles Klein's *The Music Master*, a part which he played over 1,000 times. He later appeared in *The Return of Peter Grimm*, *The Merchant of Venice*.

Warm Springs, Georgia. A health resort whose medicinal springs are useful in the treatment of infantile paralysis. It attracted national attention under the sponsorship of Franklin D. Roosevelt, who attributed his own recovery from the malady largely to the benefits of its springs. To the Warm Springs Foundation, established in 1927, President Roosevelt, in 1934, turned over a fund of \$1,003,030, which was the proceeds of over 5,000 balls held throughout the country on

his birthday, January 30. In every year since these annual balls were held with increasing success. The receipts are designated to be used for local treatment of infantile paralysis and for the Foundation.

Warner, Charles Dudley (1829-1900), American author and editor, was born at Plainfield, Mass. As associate editor of Harper's Magazine he edited *American Men of Letters* and with Mark Twain wrote *The Gilded Age*. Among his essays are *My Summer in a Garden* and *Backlog Studies*.

Warner, Langdon (1881-), archaeologist. He spent much time in the Orient (1906-13). He was field agent of the Cleveland Museum of Art, 1915; from 1917-23, director of the Pennsylvania Museum, Philadelphia; since 1923, field fellow, Fogg Museum, Harvard U., and has been in charge of two expeditions to China for the Museum.

War of 1812. The contest between the United States and Great Britain growing out of the attitude of the latter toward American commerce, and the insistence on the 'Right of Search' of American ships for alleged deserters from the British navy. Not content with searching merchant vessels, on June 7, 1807, the British ship *Leopard* fired upon the American frigate *Chesapeake* and took by force three American citizens and one British subject. President Jefferson immediately closed the ports of the United States to British war vessels, and the act was disavowed, but no reparation was made.

Meanwhile the British government by its 'orders in council' (1806-07) declared a blockade of all European ports under the control of Napoleon and authorized the seizure of any neutral vessel bound for one of the closed ports. Napoleon retaliated by his Berlin Decree, and later by the Milan Decree declaring a blockade of British ports and also authorizing the seizure of neutral vessels. Between the two millstones the American carrying trade was destroyed. The Congress of 1811, elected on the war issue, contained many new men, and the influence of Henry Clay, J. C. Calhoun, William Lowndes and others led to a formal declaration of war June 18, 1812. Late in July Gen. Wm. Hull crossed into Canada and threatened Malden. He was forced to fall back and surrendered without firing a gun Aug. 16, 1812. Two months later a small American force crossed the Niagara River and attacked Queenstown, but the militia refused to follow and another surrender followed.

These failures on land were relieved by un-

expected victories on sea. Capt. Isaac Hull in the *Constitution* captured the British *Guerriere* in the Gulf of St. Lawrence Aug. 19, and Oct. 13 the *Frolic* was taken by the *Wasp*. A few days later Captain Decatur in the *United States* took the *Macedonian* and late in December the *Constitution*, commanded by Bainbridge, took the *Java*. Scores of privateers also were preying upon British commerce. Three expeditions against Canada were planned for 1813. York (Toronto) was captured and partially destroyed. An expedition against Montreal failed, but the British were repulsed at Sackett's Harbor. Capt. O. H. Perry built nine small vessels on Lake Erie and on Sept. 10, 1813, captured a British flotilla of six heavier vessels. Wm. Henry Harrison, on receipt of this news, forced General Proctor to retreat into Canada, and on Oct. 5, in the battle of the Thames, routed the British and their Indian allies. Tecumseh was killed, Michigan was regained, and Upper Canada was retained to the end of the war.

By 1814, however, competent American generals had come to the front. Andrew Jackson defeated the Creek Indians, who had been aroused by British and Spanish emissaries (March 27, 1814). Jacob Brown and Winfield Scott again invaded Canada and gained victories on July 5 and July 25 at Chippewa and Lundy's Lane. Meanwhile British depredations on the Atlantic coast continued, and during the summer a fleet carrying 3,500 soldiers under General Ross assembled in Chesapeake Bay. The American militia was easily defeated at Bladensburg, Md., Aug. 24, 1814. General Ross occupied Washington and destroyed the Capitol, the White House, and other buildings in retaliation for the destruction of the public buildings at York. Baltimore was next attacked, but resisted stubbornly, General Ross was killed, and Fort McHenry successfully withstood bombardment. With the purpose of seizing the Louisiana Purchase and gaining control of the Mississippi River, Admirals Cockburn and Cochrane with the Chesapeake fleet and army were ordered to unite with a force under Sir Edward Pakenham to attack New Orleans. Andrew Jackson took command of the small American forces early in December and by his fierce energy overcame apparently insurmountable obstacles. Though greatly outnumbered, his forces defeated the British regulars Jan. 8, 1815. (See NEW ORLEANS, BATTLES OF.) This battle was wholly unnecessary, however, as the news soon arrived that a treaty had been signed at Ghent, Dec. 24, 1814, two weeks before. This instrument practically restored the conditions of 1812.

Impressment of seamen was not formally given up, but was no longer practised. Other questions in dispute were left to be settled by commissions.

Warrant. In its broadest legal sense, this term denotes written authority from one person to another, to do or receive something. In civil and criminal practice it denotes a signed order of a court, directing an officer named therein to do some act, as to attach goods of a debtor, to seize property claimed to be wrongfully detained, to search the person or premises of one accused of crime, to arrest a person.

Warrant Officers, officers who are given rank in the navy by virtue of a warrant. In the United States Navy warrants are issued by the Secretary of the Navy. Warrant officers are boatswains, gunners, carpenters, sailmakers, machinists, and pharmacists.

Warranty. Strictly, this term denotes an agreement with reference to personal property which is the subject of a contract of sale, but collateral to the main purpose of such contract, the breach of which gives rise to a claim for damages, but not a right to treat the contract as repudiated. It is a matter of construction of the words and terms of a contract of sale, whether a stipulation therein is a condition or a warranty. In policies of insurance and charter parties, the term warranty is employed in the sense of a condition, and a breach avoids the contract. See PROCESS; SALE; WRIT.

Warraus, or Guarraunos, a tribe of South American Indians of the Guiana seaboard, driven out by the intruding Caribs and Arawaks. A few small groups survive.

Warren, Earl (1891-), Am. lawyer and politician, b. Los Angeles; ed. Univ. Calif. Atty. Gen. of Calif. 1939-43; gov. Calif. 1943-53. Apptd. 14th Chf. Justice of U. S. 1953.

Warren, John Collins (1778-1856), American surgeon, son of John Warren, was born in Boston; ed. Harvard. He was a founder of the McLean Asylum for the Insane, and also of the Massachusetts General Hospital, of which he was chief surgeon. It was in the theatre of this hospital that Warren operated on a patient etherized by Dr. William T. G. Morton in 1846, this being the first public operation under ether anæsthesia. He founded the *Boston Medical and Surgical Journal* in 1828, and was its editor for many years.

Warren, Joseph (1741-75), American patriot, was born in Roxbury, Mass., and was graduated from Harvard (1759). In 1774 he drafted the famous 'Suffolk Resolves,' calling

for the use of force, if necessary, in resisting the aggressions of the mother country. He was a member of the First, Second, and Third Provincial Congresses of Massachusetts, presiding over the third; and on April 19, 1775, he took part in the Lexington-Concord fight which opened the Revolutionary War. He refused the chief command at the Battle of Bunker Hill (June 17), taking part as a volunteer, and was instantly killed.

Warren, Whitney (1855-1934), U. S. architect, was born in New York City, and studied under Daumet and Girault in Paris. He settled in New York, and organized the firm of Warren & Wetmore, which designed the Grand Central Station, the Belmont and Ritz-Carlton Hotels, the bronze gates for the Cathedral of St. John the Divine, and the Chelsea docks, all in New York; the Grand Trunk Station in Winnipeg, Man.; and the Paul Jones Crypt at the U. S. Naval Academy. He planned the reconstruction of the University of Louvain, destroyed by the Germans in 1914.

War Savings Stamps, a special and unusual form of government security, authorized by the U. S. Congress in an Act approved Sept. 24, 1917, with a view to meeting part of the expenses of the nation incident to its participation in World War I. A campaign for the sale of these stamps was begun on Dec. 3, 1917, throughout the United States, with a view of raising a \$2,000,000,000 loan by December, 1918. The stamps were of two denominations, 25 cents and \$5.00, known respectively as *Thrift Stamps* and *War Savings Stamps*. In January, 1919, a second issue of \$2,000,000,000 was made on the same terms as the first. If the owner of a War Savings Certificate wished to turn the Stamps into cash before the date of maturity, he might do this by giving any money-order post office ten days' notice, in writing, and then calling and receiving for each Stamp on his Certificate its cash value at that time. During the time of issue more than \$1,000,000,000 worth of the certificates were sold. War savings stamps were also issued during World War II.

Warsaw, the capital and largest city of Poland, is situated on the west bank of the Vistula; 389 m. e. of Berlin. The city occupies a crescent-shaped site about 120 ft. above the level of the Vistula, which is here crossed by three bridges. Notable features of the city are the imperial chateau of Lazienki, built for King Stanislaus Poniatowski in 1767-88, and the beautiful Lazienki park; the old market place, surrounded by quaint buildings and occupied solely by Jews; the University, suppressed in 1832 and reopened in 1861: the

Roman Catholic Cathedral of St. John, a Gothic edifice of the 13th century; the Church of the Holy Cross; and the Russian Cathedral of St. Alexander Nevski, a Byzantine structure completed in 1912. Warsaw is a city of great industrial and commercial importance. Iron and steel goods, machinery, silver-plated ware, leather goods, tobacco, sugar, hosiery, gloves, and household decorations are manufactured. The city was badly damaged by German bombing planes and artillery in Sept. 1939. The population is 1,086,000.

Warship. See *Battleship*; *Cruiser*; *Navies*; *Navy*, U. S.; *Shipbuilding*; *Submarine*; *Torpedo Boat*.

Wars of the Roses. See *Roses*, *Wars of the*.

Wart, or *Verruca*, a papillary outgrowth from the skin, ensheathed by a thick covering of hard, dry cuticle. From friction and exposure to the air the surface usually presents a horny texture, and is rounded off into a small button-like shape. Sub-ungual warts originate beneath the nail, and as they increase they crop out either at the free extremity or the side of the nail. Venereal warts are caused by the direct irritation of the discharges of gonorrhoea or syphilis.

Warthe, or *Warta*, river of Poland and Germany, rises in Poland, and flows generally n.w., with many windings, to the Oder at Küstrin. Its length is about 450 m., of which 250 m. are navigable.

Wart Hog (*Phacochoerus*), genus belonging to the pig family, with two species, peculiar to Africa. The wart hogs are characterized by their very large heads, which bear large, wart-



Wart Hog.

like processes at the sides. The tusks are greatly developed, those of the upper jaw being considerably larger than those of the lower. In habits the wart hogs resemble pigs. Two species are known—*P. africanus*, which is widely distributed over the continent; and *P. allasi*, confined to Southeast Africa.

Warton, Thomas (1728-90), English poet and critic, brother of Joseph, was born at Basingstoke. His *History of English Poetry* (1774-81) gave romanticism a fresh impulse, in

conjunction with Percy's *Reliques*. In 1757 he was appointed professor of poetry at Oxford, and held the office for the usual term of ten years. He was poet laureate from 1785 until his death.

War, U. S. Department of, one of the three original executive departments of the U. S. Government, created by act of Congress in 1789, the others being the Departments of State and of the Treasury. At the head of this Department is the Secretary of War, who is charged with carrying out the policy of the President in military affairs and with the general administration of the Department, including all matters relating to national defence and coast fortification, army ordnance, river and harbor improvement, all purchases of army supplies, and all expenditures for the support, transportation, and maintenance of the army. He is further charged with the supervision of the U. S. Military Academy at West Point, of military education in the Army War College, and of military posts and parks, and with the administration of the insular possessions of the United States.

Warwick, capital of Warwickshire, England, on the Avon; 21 m. s.e. of Birmingham. The Church of St. Mary retains 12th to 15th century work, and has a monument to Richard Beauchamp, earl of Warwick, and his countess. The industries include the making of art furniture, gelatine, and agricultural implements; and there is a considerable trade in agricultural produce. The town ranked as a borough from the time of Edward the Confessor. The fine baronial castle, situated on a rocky eminence above the Avon, is said to have been founded by Elfleda, daughter of King Alfred. In 1642 the castle was unsuccessfully attacked by the royalists. It contains valuable art collections, including works by Rubens and Van Dyck; p. 13,459.

Warwick, Richard Neville, Earl of (1428-71), known as the 'King Maker,' famous English warrior, eldest son of Richard Neville, earl of Salisbury (1400-60). He married Anne, daughter and heiress of Richard de Beauchamp, earl of Warwick, and was himself created earl of Warwick (1449). Warwick's impetuous onslaught contributed greatly to the Yorkist victory at St. Albans (1454); and in the subsequent period of Yorkist ascendancy he was rewarded with the governorship of Calais and the command of the seas. In 1460 he won the Battle of Northampton, captured Henry vi., and entered London.

After the disastrous Battle of Wakefield (1460), the leadership of the Yorkist party devolved on Warwick, in behalf of Edward, earl

of March, Richard's son. Though defeated at the second Battle of St. Albans, Warwick again entered London, always Yorkist in sympathy, and Edward iv. was proclaimed king (March, 1461).

Warwick was now at the height of his power, being Grand Chamberlain of England, and warden of the Cinque Ports and of the East and West Marches of Scotland. He conducted Henry a prisoner to the Tower in June, 1465. From 1464 on, however, he had misunderstandings with Edward, who resented the supremacy of the Nevilles. In 1469 the King Maker was in open revolt; and an insurrection in Yorkshire and the defeat of the royal forces at Edgecote threw Edward into his hands. The Nevilles, after a short period of power, were declared traitors, and fled to France. There Warwick was reconciled by Louis xi. with the Lancastrian Queen Margaret; and in 1470 he landed at Plymouth at the head of a Lancastrian army. Edward escaped to Holland, and Henry vi. was replaced on the throne. But Edward landed on March 14, 1471, at Ravenspur, gathered an army, and at the Battle of Barnet Warwick was slain.

Warwickshire, midland county of England. The surface is diversified, but with no great elevations. The principal rivers are the Avon, Stour, and Tame. Coal is extensively mined; gypsum and manganese are found; and there are quarries of diorite and limestone. The county is largely agricultural and pastoral; cereals, beans, potatoes, turnips, mangold, clover, and hay are the chief crops. The manufactures include heavy iron goods, hardware, firearms, jewelry, etc. Area, 902 sq. m.; p. 1,534,782.

Wasatch Mountains, a rugged mountain range, part of the Rocky Mountain system, extending from the southeastern part of Idaho s. through the middle of Utah nearly to the Colorado River, and forming the eastern boundary of the Great Basin. It contains coal, iron and silver, and its middle slopes are covered with pine forests.

Washburne, Elihu Benjamin (1816-87), American political leader and diplomat, was born in Livermore, Me. He was a persistent opponent of corrupt legislation, and received the name of the 'Watch Dog of the Treasury.' When Grant became President, he appointed Washburne Secretary of State, and soon afterward Minister to France. During the terrible days of the Paris Commune (1871) he was the only foreign representative who remained at his post.

Washington, the most northwesterly State of the United States. It is bounded on the n.

by the Canadian province of British Columbia on the e. by Idaho; on the s. by Oregon; and on the w. by the Pacific Ocean. The Columbia River marks much of the southern boundary, and the Snake River a small portion of the eastern boundary. With extreme dimensions of 340 and 230 m., it has a total area of 69,127 sq. m., of which 2,291 are water.

The central topographical feature of Washington is the Cascade Mountain range, which crosses the State from n. to s. with a slight westward trend, dividing it into two unequal parts, commonly designated as Eastern and Western Washington. The range has a general crest level of about 6,000 ft. Among the loftier summits are the magnificent cone of Mount Rainier (Tacoma) (14,408 ft.), the loftiest peak of the Cascades, Mount Adams (12,307 ft.), and Mount Saint Helens (9,671 ft.), in the south, and Mount Baker (10,750 ft.) and Glacier Peak (10,436 ft.) in the north.

The principal river is the Columbia, which enters the State in the n.e., and flows across to the southern boundary in a great bend—giving the surrounding territory the local name of 'the Big Bend Country'—and thence to the ocean. This river is navigable for practically its entire length. Lake Chelan, lying between the big bend of the Columbia and the Cascade Mountains, has a length of 40 m.

The Cascade Range divides the State into two distinct climatic zones. In the eastern section the climate is dry or semi-arid. In Western Washington the climate is equable. At Tacoma the mean annual temperature is 50.6° F. The soil in Western Washington consists largely of glacial drift, being a mixture of clay and sandy loams upon the uplands, which is very productive when properly handled. In the lower lands there are large areas of silty loam and semi-peat lands, rich in organic matter, which are fertile, and grow all kinds of crops that thrive in a porous soil. In Eastern Washington the soil is in large part a fine volcanic ash, and strikingly indicates the geologically recent volcanic action in the district.

The mineral deposits of Washington constitute one of its important resources. The State ranks thirtieth among the States in mineral production. Of the non-metallic minerals the most important were coal, clay, sand and gravel, building stones and magnesite; the principal metals were gold, silver, copper and lead. Cement, diatomite, iron, lime, mercury, natural gas, silica, zinc were also produced. Washington ranks first among the States in the mining and calcining of magnesite. The value of this industry is not re-

ported. The leading mineral industry is bituminous coal mining.

Washington has extensive fisheries, ranking second among the States in the value of the industry, being surpassed only by California. The propagation of salmon was undertaken by the State in 1895, and since that time numerous hatcheries have been established along the rivers and lakes by the State and Federal Governments; millions of fry are planted annually.

The principal agricultural sections are the valleys of western Washington and southeastern and the northeastern parts of the State. The greater portion of the Columbia River plateau was formerly devoted to grazing, but the higher altitudes are now given over to wheat raising; the valleys, almost entirely under irrigation, produce chiefly apples and alfalfa. In the eastern section of the State, the rainfall is insufficient, and irrigation is successfully carried on. Wheat is by far the most important crop. It is grown in the district e. of the Snake River and in the region of the Spokane River, without irrigation. Other important crops include: hay and forage, white potatoes, oats, barley, and corn. The cultivation of orchard fruits is carried on through the farming area, and fruit raising has been successful in the irrigated lands of central Washington. Western Washington is an excellent dairy country and some of the largest condenseries and butter and cheese plants are operated in this area.

There are about 500 mills engaged in the lumbering industry in Washington. Other important manufactures are: paper and pulp; grain and flour mill products; canning and preserving, and slaughtering and meat packing. Mountain streams with an abundant flow at all seasons offer an unlimited supply of hydroelectric power for industrial enterprises, and large power plants have been established upon the Snoqualmie, Puyallup, Nisqually, White, Nooksack, Cedar, Skagit and Spokane rivers. It was estimated by the U. S. Geological Survey on Jan. 1, 1932, that Washington had developed hydro-electric power of 1,011,306 horsepower, the State ranking third—California and New York ranking first and second with 4,794,431 and 3,554,278 horsepower respectively.

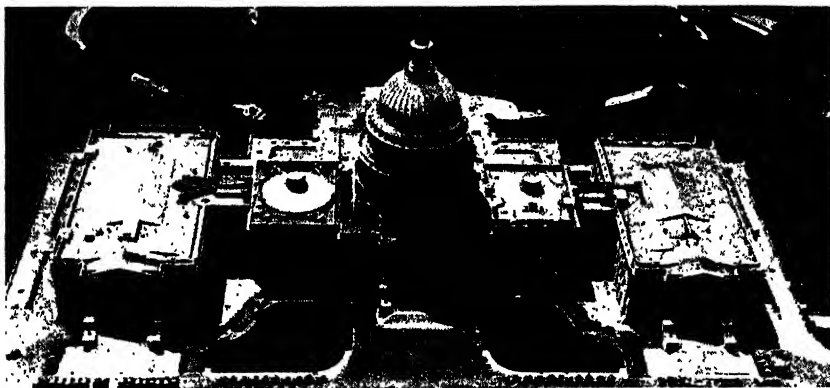
Puget Sound is a vast harbor with 1,594 m. of shore line, and Seattle, its principal seaport is becoming the metropolis of the northwest. It handles most of the traffic between the United States and Alaska.

According to the Federal Census of 1950 the

total population of the state of Washington was 2,378,963. This showed an increase of 642,772 people since the 1940 census. The state's urban population was 40.3 per cent. The population of the principal cities in 1950 was: Seattle, 467,591; Spokane, 161,721; Tacoma, 143,673; Bellingham, 34,112; Everett, 33,849. The State maintains the University of Washington, at Seattle, and the State College.

of Public Lands, and Insurance Commissioner, each elected for a term of four years. Under the Reapportionment Act of 1929 Washington has 6 Representatives in the National Congress. Olympia is the State capital.

The region of the present State of Washington was visited in 1592 by Juan de Fuca, a Greek explorer. In 1775, Heceta, a Spanish explorer, sailed n.; and on July 14 Europeans



The Capitol, Washington, D.C.

The legislature consists of a House of Representatives of not more than 99 nor fewer than 63 members, and a Senate of not more than one-half nor less than one-third as many mem-

bers for the first time set foot upon the soil of the northwest coast, at a place now known as the mouth of the Hoh River. In 1789, Captain Kendrick of Boston, in the *Columbia*, passed



Washington, D. C.: New Supreme Court Building.

bers as there are Representatives. The membership of both houses is apportioned anew every five years. One-half the senators and all the representatives are elected biennially. The chief executive officers are the Governor, Lieutenant-Governor, Secretary of State, Treasurer, Auditor, Attorney-General, Superintendent of Public Instruction, Commissioner

through the Straits of San Juan de Fuca, and around Vancouver Island to the n., being the first to sail through the passage between Vancouver Island and the mainland. The title of the United States to the land now known as Washington and Oregon rests, first, upon the discoveries by Captain Gray of the entire coast of Washington, and the discovery of the Co-

Columbia River in 1789 to 1792; second, upon the exploration of the Lewis and Clark expedition in 1805-06; and, third, upon the occupancy by the Astor Fur Company (an American company) in 1811-12—making this the only territory that never at any time was legally under any other flag except the Stars and Stripes.

Fort Walla Walla, on the present site of Wallula, was established in 1818; Fort Vancouver in 1824; Fort Colville, on the Columbia River, in 1825; and Fort Nisqually, on Puget Sound, in 1833. The northern boundary was long a subject of dispute between the United States and Great Britain, but a settlement was reached in 1846 by the Webster-Ashburton Treaty which fixed the boundary from the Rocky Mountains to the Pacific along the forty-ninth parallel of latitude. (See OREGON QUESTION.)

Agitation for Statehood began in 1876. On Feb. 2, 1889, the Enabling Act of the State of Washington was passed by Congress, and on Oct. 1, 1889, the State constitution was ratified. In recent years the progress of the State has been remarkable. In 1909 the Alaska-Yukon-Pacific Exposition was held in Seattle. See W.P.A. Writers' Project, *Washington* (1941).

Washington, the capital city of the United States, and the seat of the Federal Government since 1800. It is co-extensive with the District of Columbia, and is on the left or eastern bank of the Potomac River, 108 m. above its entrance into Chesapeake Bay, and about 185 m. from the Atlantic Ocean. The District of Columbia was established as the seat of government of the United States by Congress on July 16, 1790, and now embraces an area of 69 sq. m., of which 60 are land. The District is bordered on the w. by the Potomac, which is joined from the e. by the Anacostia River or Eastern Branch, forming a southern boundary of the city. The Potomac is navigable to Washington, and is crossed to the Virginia shore by four bridges: the Arlington Memorial Bridge, connecting the Mall, at Lincoln Memorial, with Arlington National Cemetery; Francis Scott Key Bridge; an old highway bridge; and a railroad bridge. The original plan of the city is credited to L'Enfant, a French engineer, who prepared it at the request of Washington; but the work was completed by Andrew Ellicott. The present city covers an area of about 5 by 3 m., embracing nearly 15 sq. m., including Georgetown, which was annexed as West Washington on Feb. 11, 1895. Pennsylvania Avenue, 160 ft. wide, running from Anacostia River on the eastern Rock Creek on the western boundary of the

original city, and connecting the Capitol with the White House, is the principal thoroughfare. With the Capitol as a centre, Washington is divided into four sections, northeast, northwest, southeast, and southwest.

The public buildings are the chief attraction of Washington. Of these the Capitol, originally planned by William Thornton and continued by Latrobe and Bulfinch, is the most important. It crowns the summit of Capitol Hill, and is 751 ft. long, covering about three and one-half acres. The original building, of which the corner-stone was laid by Washington, was burned by the British in 1814; the present structure dates from 1818; and with its wings was not complete until 1863. The Rotunda, under the dome, 96 ft. in diameter and 180 ft. high, contains famous historical paintings. The Senate Chamber is in the north wing, the House of Representatives in the south; the Supreme Court occupies the new Supreme Court building. The grounds surrounding the Capitol embrace about 50 acres, embellished with fountains and statuary. On a square of 10 acres, e. of the Capitol, is the Library of Congress, a building of white granite in the style of the Italian Renaissance. (See LIBRARY OF CONGRESS.) On Pennsylvania Avenue, at Fifteenth Street, is the U. S. Treasury, a granite building in the Ionic style. West of the Treasury, on Pennsylvania Avenue, is the White House, the President's residence, of freestone painted white, 170 by 86 ft. (see WHITE HOUSE).

West of the White House is the State Department Building. The Patent Office occupies a Doric building between Seventh and Ninth, F and G Streets; and opposite on F Street is the white marble building of the Land Office. At the western end of the Mall, the great parkway leading from the Capitol to the Potomac River, stands the Lincoln Memorial. (See LINCOLN MEMORIAL.) South of Pennsylvania Avenue, on the Mall are the huge conservatories of the Botanical Gardens; the Smithsonian Institution; and the Bureau of Engraving and Printing. The National Museum on the Mall, between Ninth and Twelfth Streets, and a \$1,500,000 marble building of the Department of Agriculture, w. of the Smithsonian grounds, are notable. On a commanding site, overlooking Rock Creek, n. of Georgetown, is the U. S. Naval Observatory, with its 26-inch equatorial telescope. In 1926, a \$115,000,000 building program was inaugurated which involved the triangle between Pennsylvania Avenue and the Mall. In 1934 the first of this new group was completed—the Bureau of Internal Revenue Building, 10th

12th and B to C Streets North West. In 1932 the second unit of the group was completed—the Department of Commerce Building at Constitution Avenue and 14th Street North West, covering eight acres. Other buildings in the 1926 program are: the Department of Labor Building, the Post Office, the Interstate Commerce Building, and the Department of Justice Building.

One block w. of the White House is 17th Street, which offers a mile of galleries, museums, and memorials, among them the Corcoran Gallery, the American Red Cross Building (see RED CROSS SOCIETIES), Continental Memorial Hall (of the Daughters of the American Revolution), and the Pan American Building—all conspicuous for their beauty. Potomac Park borders the Pan American grounds on the s. It is famous for the Cherry Blossom Drive extending along the waterfront for a distance of six miles. On Mount Saint Albans rises the Gothic cathedral of St. Peter and St. Paul, still in the process of construction. This is the national cathedral of the Episcopal Church and was designed by Frohman, Robb and Little. Woodrow Wilson is buried here. There are three art galleries in Washington. The Corcoran Art Gallery; the National Gallery of Art, and the Freer Gallery of Art.

An elaborate park system is in course of development, which will ultimately surround the city with parks and connecting boulevards. The principal park is Rock Creek, to the n. of the city, containing 1,632 acres extending along both sides of Rock Creek. Scattered throughout the city are numerous squares, circles, and small parks, of which Lafayette Square, in front of the White House, is the most famous. Nearly all of them contain statues. The most conspicuous of the monuments in Washington is that erected to George Washington, which is on the Mall near Fourteenth Street; it is 555 ft. high, and at the time of its erection was the tallest piece of masonry in the world.

The principal educational institutions are George Washington (formerly Columbian) University; Georgetown University (1788); Carnegie Institution of Washington; Catholic University of America (1889); Howard University (for Negroes); American University; Washington College of Law; Washington College of Music; Catholic Sisters College; District of Columbia College; National University Training School. The most important industries are: printing and publishing; bread and other bakery products; and ice cream. The principal government industry is the Government Printing Office.

Population.—The population was 3,210 in 1800; 75,080 in 1860; 278,718 in 1900; 331,069 in 1910; 437,571 in 1920; and in 1950, 792,234. Consult W. P. A. Writers' Project, *Washington, D. C.* (1942).

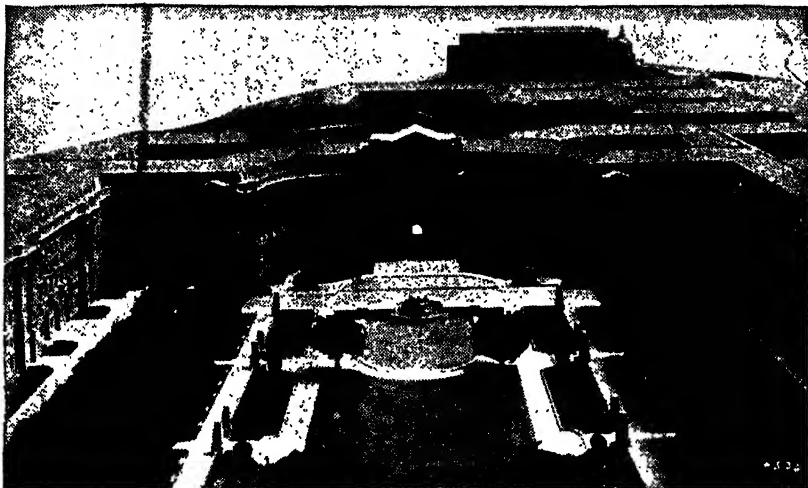
Washington, city, Pennsylvania, county seat of Washington co. It is the seat of Washington and Jefferson College, Washington and Jefferson Academy, and Washington Seminary; p. 26,166.

Washington, Mount, the highest peak (6,293 ft.) of the White Mts. (Presidential Range) and of the Northeastern United States. is in Coos co., New Hampshire; 75 m. n.e. of Concord. On its summit, which affords a superb view, and which is reached by a motor road and a rack-and-pinion railroad (completed in 1869), is a hotel.

Washington, Treaty of. A treaty referring the *Alabama* claims and the San Juan boundary question to arbitration; settling disputes with regard to fisheries, signed May 8, 1871. See ALABAMA, THEE.

Washington, Booker Taliaferro (c. 1858-1915), American negro educator, son of a mulatto slave woman and a white man, was born near Hale's Ford, Va. In 1872 he worked his way to the Hampton Normal and Industrial Institute, where he paid his expenses by acting as a janitor. In the fall of 1875 he went to Walden, W. V., and taught there for three years. He then attended the Wayland Seminary in Washington, and in 1879 was appointed an instructor at Hampton. In 1881 he accepted a call to organize and become the principal of a normal school at Tuskegee, Ala. (See TUSKEGEE.) In advancing the interests of the school Mr Washington made a great many public addresses both in the North and in the South, and ultimately acquired the reputation of being one of the ablest public speakers in the country. He founded in 1892 the Tuskegee Conference, and in 1900 organized the National Negro Business League. The degree of A.M. was conferred upon him by Harvard University in 1896, and that of LL.D. by Dartmouth in 1901. His publications include: *The Future of the American Negro* (1899); *Up from Slavery* (1901, first published serially in *The Outlook*); and *Character Building* (1902).

Washington, George (1732-1799), first President of the U. S., was born at Bridges Creek, Westmoreland co., Va., Feb. 22, 1732. He was the eldest son of Augustine Washington and Mary Ball (a second wife), and on his father's side was descended from a north of England family (see SULGRAVE MANOR). In



Washington, D. C.: The Great Plaza.



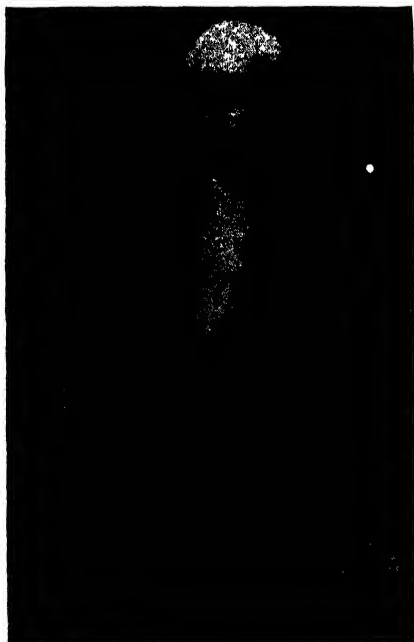
Washington, D. C.: Department of Commerce Building.

1735 the family removed to Stafford co., not far from Fredericksburg. Such education as Washington received was of the elementary sort, and his life during these early years was essentially that of the frontier. In 1747 he went to live with his elder brother, Lawrence, who had inherited the estate of Mount Vernon, on the Potomac. Through the influence of Fairfax he was appointed a public surveyor. In 1751 he accompanied his brother Lawrence to the West Indies, where he had the smallpox. In October, 1753, Washington was commissioned by Governor Dinwiddie of Virginia to carry to the French on the Ohio a warning against intrusion upon English territory. In April, 1754, he set out with two companies for the Ohio, but, after defeating a French detach-

ment under Jumonville, was surrounded by the French and Indians at an indefensible place called Great Meadows, and on July 4 was compelled to capitulate. When in February, 1755, Gen. Braddock arrived in Virginia, Washington accepted a place on his staff, with the rank of colonel. In the campaign which followed, Washington's warnings were disregarded, and on July 9 the English were ambushed and met with a disastrous defeat on the Monongahela, their commander being among the dead. In 1758 he commanded the Virginia troops in the expedition of General Forbes, which achieved the expulsion of the French from the Ohio country. In December of that year he resigned his commission.

On January 6, 1759, Washington married

Martha Dandridge, widow of Daniel Parke Custis. He had previously inherited his brother's property, and this, joined to his wife's wealth, made him one of the richest men in America. The next few years were passed at Mount Vernon, which he enlarged and improved. He was a member of the first Continental Congress, in 1774, but appears to have taken no part in the debates. On June 15, 1775, Washington was appointed by the Congress commander-in-chief of the Continental Army. He at once set out for Massachusetts, and on July 3 took command of the American forces at Cambridge.



George Washington.

During the Revolutionary War (see REVOLUTION, AMERICAN) Washington had the triple task of creating an army, resisting the British, and dealing with a vacillating, incompetent, and defectively constituted Congress. For later events see U. S. History.

Bibliography.—For a list of Washington's writings, consult Winsor's *Narrative and Critical History of America* (vol. viii.). Many were also published with a *Life* by Chief Justice John Marshall in 5 vols. in 1804. W. C. Ford's edition of his complete works (14 vols.) contains many letters and papers not previously published. Among the biographies of Wash-

ington may be named those by Marshall, Washington Irving, Sparks, Hale, and R. Hughes.

Washington and Jefferson College, located in Washington, Pa., was chartered in its present form in 1865, as the result of the union of two colleges, Jefferson College, at Canonsburg, chartered in 1802, and Washington College, at Washington, in 1806.

Washington and Lee University, a collegiate institution for men at Lexington, Va., founded as Augusta Academy, near Staunton, in 1749. In 1782 the school was incorporated near Lexington as Liberty Hall Academy. It received from George Washington in 1796 a gift of shares in a canal company, which still yields an income of \$3,000 to the University, and in 1798 was renamed Washington Academy. In 1813 it was rechartered as Washington College, and in 1871 under its present title. The work of the College was interrupted during the Civil War, but was resumed in 1865, when Gen. Robert E. Lee became president.

Washo, an Indian tribe settled in the region w. of Reno and Carson, Nev.

Wasp, a name applied to two divisions of the Hymenoptera—the Diptoptera, or true wasps, and the Fossores, or fossorial solitary wasps. The true wasps are either solitary or social. Of the solitary forms, mention may be made of the genera *Eumenes* and *Odynerus*, of which many species occur in North America. These wasps construct small nests either in a burrow or attached to trees or walls, which are stocked by the mother wasp with animal food. The social wasps belong to the family *Vespidae*, which includes the paper-making wasps and hornets. As the wasps are very sensitive to cold, the nest is enveloped in a papery substance, apparently to maintain a high temperature.

Wassermann, August von (1866-1925), German physician, distinguished pupil of Koch and Ehrlich, discovered (1906) the 'Wassermann reaction' for syphilis.

Wassermann, Jacob (1873-1934), German novelist, wrote *The World's Illusion*, *Dr. Kerkhoven*, and the autobiography, *My Life as German and Jew*.

Watch, on shipboard, a division of the crew into two—or if it be a large crew into three—sections, that one set of men may have charge of the vessel while the others rest. The day and night are divided into watches of four hours each, except the period from 4 to 8 P.M., which is divided into two *dog watches* of two hours' duration each.

Water, H_2O , a compound of one volume o.

oxygen gas with two of hydrogen, the proportions by weight being 8 of the former to 1 of the latter. It occurs in vast quantities in nature in the solid, liquid, and gaseous states, covering no less than two-thirds of the surface of the globe. It constitutes about seven-eighths of the animal body and nine-tenths of many plants, while it is also present in many minerals. Water is formed in many chemical actions—for example, by the combustion of hydrogen and its compounds. At ordinary temperatures water is an odorless faintly greenish-blue liquid. It boils at 100° c. under normal pressure, and freezes with expansion at 0° c. It is incompressible, a poor conductor of heat and electricity, and is taken as a standard of comparison in determination of specific heat and specific gravity, and in settling the unit of temperature. Water has great solvent power. Chemically, water is neutral, but enters easily into many chemical actions.

Water for Domestic Use.—For drinking, water should not be too soft, and must not contain much magnesium compounds, or be able to dissolve lead. Organic matter in water is represented by the free and the albuminoid ammonia, chlorine, and nitrates, and includes those substances which a water may derive from animal or plant products. The diseases carried by water are due to specific micro-organisms, particularly those that cause typhoid fever and cholera. A high bacterial count, particularly if *B. coli*, or other gas-producing organisms are present, is presumptive evidence of sewage contamination; high chlorine (unless near the sea) and high albuminoid ammonia are further evidence to the same end. Water may be purified on a large scale by sedimentation and filtration, and on a small scale by filtration through Pasteur, Berkefeld, or other carefully designed, close-grained filters, working at a low rate, and sterilized at frequent intervals; or by boiling for half an hour. Boiled or distilled water, however, has no air in it, and is in consequence flat and insipid, and some system of aeration should be adopted to overcome this.

Water Beetles. See *Dytiscus*.

Water Bugs (Hydrocorisae or Cryptocerata), a division of hemipterous insects, characterized both by their aquatic habitat and by the fact that the antennae are concealed on the under surface of the head, and so appear to be absent.

Waterbury, city, Connecticut, county seat of New Haven co., on the Naugatuck River; 89 m. n. of New York. Waterbury is the chief brass manufacturing city in the country. It

produces annually many hundred thousands of watches, as well as clocks, rolling mill and foundry products, pins, buttons, cutlery novelties, rubber and elastic goods, plated and Britannia ware. Waterbury was first settled in 1674 and was known as Mattatuck. In 1686 it was incorporated and the name was changed to Waterbury. It was incorporated in 1853 as a city; p. 104,477.

Water Chestnut, Jesuit's Nut, or Water-caltrops. The name water chestnut is also sometimes given to the edible tubers of the Chinese plant *Eleocharis tuberosus*.

Water Clock. See *Clepsydra*.

Water-color Painting, the process of painting with colors mixed with water instead of oil. Water-color painting includes painting in 'tempera,' undoubtedly the most ancient mode of painting, so-called because the color is to a large extent tempered with a glutinous binding medium, soluble in water, such as size, gums, or egg. The binding medium of ordinary water colors is a very small proportion of gum or some similar substance. In their preparation there is also added a little glycerine, to keep them moist, that they may be easily soluble in water. The preparations for tempera are fully described in such works as Field's *Grammar of Colouring* and F. Hamilton Jackson's *Mural Painting*.

About 1890, when the New York Water Color Club was organized, water-color again resumed an important place in artistic expression after a period of neglect. Winslow Homer, 1836-1910, well known as a painter in oil, was equally distinguished for his water colors. An excellent example is *Tornado—Bahamas* in the Metropolitan Museum, New York City. Outstanding, also, is the work of John Singer Sargent, 1856-1925, whose water-colors have exerted much influence on contemporary American art. A series of 80 sketches by Sargent were bought by the Brooklyn Art Museum. Thomas Benton excels in this medium, and there are many excellent water color painters whose works are known locally. See Vernon Blake's *How to Sketch*.

See **PAINTING**. Consult Redgrave's *History of Water-colour Painting in England*; Van Buren Magonigle's *Architectural Rendering in Wash* (1921).

Water Conduits may be classed under two heads: those in which the water has its surface open to the atmosphere; those in which the water has no free surface—i. e. is flowing under pressure. The carrying capacity of a channel depends upon the cross-section area of the stream; the wetted perimeter of the channel;

the gradient of the stream, or, in pressure pipes, the hydraulic gradient or slope; the smoothness of the channel.

1. *Channels open to the Atmosphere*.—If the ground-level is suitable, a ditch will serve, the natural earth banks being left. But hard clay or gravel is able to stand a velocity of only from three to four feet per second, and light sandy soil only from a half to two feet per second. When rock is cut through, the channel is frequently left rough for economy. But a lined channel will have a greater carrying capacity than an unlined one, owing to the decrease in friction. Brick or concrete is generally used for lining in England and concrete in the United States. Where the ground-level sinks below the gradient line of the channel, the water can be carried across the low-lying ground through an inverted siphon under pressure. This is seldom done except in pipes; but still there are cases of masonry aqueducts and tunnels being so subjected to pressure, notably in the case of the New Croton Aqueduct, for New York City.

2. *Conduits under Pressure*.—Only occasionally is pressure put on masonry conduits or tunnels, or on pipes of cement or earthenware. They can, however, be constructed to stand a small head, but in almost all such cases metal pipes are used. Occasionally large mains have been laid of wooden staves clamped with steel bands. Wrought-iron tubes and steel pipes formed of riveted plates have of late years been greatly used, on account of their being lighter than cast-iron pipes of the same diameter. A pipe line requires the strongest pipes in the valleys—i. e. where it dips most deeply below the hydraulic gradient; where it approaches the hydraulic gradient at the crests the pressure is least, and the lightest section of pipes is there used. No part of the pipes ought to rise above the hydraulic gradient.

Water-cross. See **Cross**.

Water-cure. See **Hydrotherapy**.

Waterfalls are common all over the Cordilleran region of America, the Highlands of Great Britain and Scandinavia, in the Alps of New Zealand, and other mountainous areas—e. g. the Staubbach in the Alps (870 ft.), Sutherland Falls in New Zealand (1,900 ft.), Yosemite Falls in the Sierra Nevada of California (2,660 ft.). The Niagara Falls (165 ft.) are due to a resistant layer of compact Niagara limestone covering more easily eroded soft shales. Frequently the upper bed is a lava with vertical joints, as in the Victoria (Zambezi) Falls (400 ft.) or the Yellowstone Falls. A fault may also form an escarpment with falls. The Niagara Falls exhibit a most important industrial

utilization of water power.

Water-flea, a general name given to minute free-swimming Crustacea, whether fresh water or marine, especially to the members of the Ostracoda, Cladocera, and Copepoda.

Waterford, maritime county, a province in Munster, Ireland. The surface is mountainous in the n. and n.w., culminating in the Comeragh Mts. (2,597 ft.). The Grand Canal affords through navigation between Waterford and Dublin. More than half the surface is under pasture; dairy-farming is important. Marble is quarried near Cappoquin and Whitechurch. Area (admin. co.), 717 sq. m.; p. 51, 915.

Water-lily, a term applied to various water plants, especially to certain species of the genera *Nymphaea* and *Nuphar*. The beautiful white water-lily of our lakes and slow streams is *Castalia* [*Nymphaea*] *odorata*; the common yellow water-lily, or 'spatter dock,' is *Nymphaea advena*. See **NYMPHAEA**.

Waterloo, village, Belgium, 11 m. s. of Brussels. On the morning of June 18, 1815, Napoleon had assembled an army of about 74,000 men in front of the ridge of Mont St. Jean and the forest of Soignies. Wellington confronted his adversary with an army of about 67,000 strong, but composed of various nationalities. The attack began by a demonstration against the British right, but was converted into a real attack. At about half-past one the French began the first grand attack. Napoleon received news at about 3 p. m. that Grouchy would be unable to arrive in time. He resolved to make head against Bülow. Under cover of a tremendous cannonade the French captured La Haye Sainte at about six in the evening. This gave them access to Wellington's centre. Ney, thinking that Wellington was about to retreat, resolved to make a cavalry attack against the British right centre. They charged again and again, but failed to pierce the invincible squares. Meanwhile Blücher, who had arrived at St. Lambert, ordered Bülow to attack. Napoleon was compelled to detach the Young Guard and part of the Old Guard, together about 6,000 strong, to keep back the advancing Prussians, and at about six Bülow's attack was repelled. As the battle was still undecided, Napoleon resolved to strike a last blow for victory. At a little after seven the French onset began along the whole line. On the right the troops of D'Erlon gained some partial success; but on the left the defenders easily held their ground. Soon after eight o'clock part of the Prussian 1st corps made its appearance on the field, and Napoleon's right was instantly driven in, and

the French army began to dissolve in rout. A short time afterwards Bülow renewed the attack on Napoleon's right flank and rear; Planchenoit was stormed after a desperate struggle, and 40,000 more enemies bore down on the French host. The defeated army fled in disorder from the field, save the four battalions of the Guard, who, formed into squares, fought stubbornly to the last, and perished almost to a man. The French army was virtually annihilated; the losses of Wellington and Blücher were about 20,000 men.

Consult Ropes' *The Campaign of Waterloo*; Creasy's *Fifteen Decisive Battles of the World*.

Waterloo, city, Iowa, county seat of Blackhawk co., on both banks of the Cedar River. Waterloo is located in the heart of the great Corn Belt, in one of the richest agricultural sections of the world. It has abundant water-power, and manufactures tractors, cream separators, automobile tops, gas and gasoline engines, clothing, machines, brick and cement machinery; p. 65,198.

Watermelon, the fruit of the trailing vine *Citrullus vulgaris*, a plant native to Africa, but now widely cultivated throughout the world. It is of greatest commercial importance in the United States and Southern Russia. There are many cultivated varieties of watermelon. Some hard-rinded, rather solid, white-fleshed sorts, known as citrons, are used for preserves, and are not edible raw.

Water Meters are instruments for measuring the volume of flow of water—or other liquid—through a pipe. A pump may serve as meter; if the strokes are counted by a mechanical counter the count need only be multiplied by volume per stroke. This principle was formerly applied to meters. Two tanks of equal volume filling and emptying alternately under influence of a valve, which is thrown over whenever one tank is full, form a still simpler meter; this arrangement is used for boiler-feed meters.

Water-works meters, by far the most important class, are of the four following types:

1. *Disc Meters*.—Disc meters are very sensitive, and maintain their accuracy well. They are made to fit pipes from 5-8-inch to 2-inch diameter (rarely up to 6 inches), to measure flows from 3 to 20 cubic feet per minute.

2. *Rotary Meters*.—Rotary and disc meters measure positively, by displacement.

3. *Velocity Meters*.—The moving element is a small fan wheel or turbine wheel, driven by the flowing water. The measurement is *inferential*, as contrasted with positive.

4. *Venturi Meter*.—A tapering pipe flowing

full of water has lower pressure at the small end than at the large end, and the pressure difference is directly proportional to the velocity of flow (Venturi tube effect). In Herschel's Venturi meter a section of pipe tapers down to one-half or one-third the normal diameter, and beyond this gradually flares outward again. The difference of pressure between entrance point and throat is measured by a differential gauge connected to the two points by small tubes. Venturi meters offer no resistance to flow, are not subject to wear, and are suited to very large volumes of flow. The largest meter of this type in the world is installed on the Catskill Aqueduct, New York. This measures 410 ft. long, with a diameter of 7.3-4 ft. to 17 1-2 ft. The capacity is 700,000,000 gal. daily.

Water Polo, an aquatic game played by two teams of seven swimmers each, employing a white rubber 'association' football. At each end of the pool a wall space is marked off for the goal. This space is 10 ft. wide and 3 ft. above the water line.

The object of each team is to touch the opponents' goal with the ball. This may be done by tossing the ball from outside the 15-ft. line, when it counts two points, or by rushing through and holding the ball against the goal, when it counts five points. An imaginary line is drawn four feet from each goal, and no players except the goal tenders are allowed within this line until the ball is within it. Lines are also drawn fifteen feet from the goals as foul lines. A player may pass or throw the ball through the air, or may carry it with him on the surface of the water, but may not swim with it under water. Any player within four feet of the ball, or holding it, may be tackled, but a tackle under any other conditions is a foul—except within the goal section, a space four by eight feet within the four-foot line, and between two parallel lines two feet from either end of the goal, where indiscriminate tackling is allowed. The game is played in two halves of seven minutes (actual play) each, with a three minute intermission.

Water Power. A river flowing from higher to lower levels is a possible source of power because of the kinetic and potential energy of its waters. Generally, the right to develop power goes with the ownership of the river banks and bed. If a river is not navigable, ownership of its banks carries with it the ownership of the bed, and the right to make any diversion or obstruction that does not interfere with the riparian rights of others above and below stream. If a river is navigable, obstruc-

tions to the channel or diversions of the water are generally possible only with governmental permission.

In the Western States of the United States, early occupancy of public lands for mining necessitated the use of water without ownership of the river banks; while irrigation projects in the arid districts of the same States led to diversion of streams on public lands without regard to riparian rights. Thus has arisen the 'Doctrine of Appropriation,' creating water rights quite distinct from the common-law riparian rights. Up to 1920 the development of water power in public lands and forest reserves of the United States and on navigable streams was not great because of the legal restrictions thrown around such developments. As a result of a number of years' activity, however, on June 10, 1920, the President approved the Federal Water Power Act, which created a Federal Power Commission. Under the provisions of this act the commission may issue a license to develop power on such streams for a period of fifty years, with the control of rates, etc., in the hands of the commission and with restrictions on the profits permitted the developing company.

At the present day, waterpower developments may be grouped into three classes, though there is no real marked division: (1) low heads—up to some 100 ft; (2) medium heads—100 to 350 ft.; (3) high heads—reaching 2,000 to 5,000 ft. In the first class, a large flow of water is necessary for a given amount of power; in the second class, the flow is more moderate; and in the third class, a small stream is sufficient. In the first class, all the plant is close to the fall or rapids—even virtually in the dam sometimes; in the second, the plant is apt to be close to some great fall—as Niagara in America or Trollhatten in Norway—or else about one to three miles from the first of a succession of small falls. The third class covers the development of mountain brooks, as in Switzerland, or where a large aggregate head is distributed along a considerable length of channel, and is secured only by stretches of canals, flumes, and pipes of lengths up to five or ten miles. The waterpower situation in the United States has greatly changed in the last two decades, due to marked progress in electric transmission, which has extended the possible power-market area from one or two sq. m. to 50,000 sq. m. The potential hydroelectric power in the U. S. is about 69,000,000 horsepower. In 1933 the total capacity was a little less than 33 1-3 per cent of the development possible.

Consult Frizell's *Water Power; Report on*

Water Power Development (U. S. Commissioner of Corporations, 1912).

Waterproofing, the process of rendering cloth impervious to water or moisture. In 1823 Macintosh secured a patent for making waterproof cloth by dissolving rubber in coal naphtha or benzol, and, in the case of cotton or linen, spreading the mixture on the cloth, with small quantity of sulphur added. As the original Macintosh process rendered textiles not only waterproof, but airtight, it was undesirable for wearing apparel, and other methods of waterproofing were invented. One of these is the dipping of cloth in alum and soap solutions, or of gall and gelatin. See RUBBER.

Watershed, the dividing ridge from which streams flow in opposite directions. It bounds the drainage area of a river. See RIVER.

Water Snake, a genus of semi-aquatic, non-poisonous snakes found in both the eastern and western hemispheres. Ten species have been identified in North America, the majority of them e. of the Mississippi. The Common Water Snake (*Tropidonotus fasciatus*) is found from Canada to North Carolina and westward to Kansas.

Water Spider (*Argyroneta aquatica*), a spider of the family *Argyronetidae*, living in the ponds and ditches of the British Isles and elsewhere in Europe.

Waterspout. When a whirlwind occurs over the sea or on expanses of fresh water, such as lakes or rivers, a waterspout results. Its characteristic feature is a tapering cloud, shaped like a funnel. It appears first at the under surface of the overhanging clouds, assuming the form of a small pendant, and apparently descends to sea level, where the greatly agitated waters ascend to meet it. The greater part of the spout, however, is composed of vapor condensed from the atmosphere, and is therefore fresh water. Waterspouts are most frequently met with in warm equatorial seas, where the winds are light or calm.

Watertown, town, Middlesex co., Massachusetts, on the Charles River; 6 m. w. of Boston. The U. S. Arsenal, occupying 100 acres on the river side, is one of the principal arsenals in the country. Watertown was founded about 1630, being one of the earliest settlements of the Massachusetts Bay colony. In 1632 its residents made the first protest in America against arbitrary taxation, which led to the establishment of representative government in the colony. The Provincial Congress met here in the First Parish Church from April to July, 1775; the Massachusetts General Court convened here from 1775 to 1778. The

Perkins Institute for the Blind is situated here; p. 37,329.

Waterways. A waterway may be defined as any aqueous channel either artificially or naturally limited in section so as to make a principal channel or fairway for navigation, or a channel through which water may flow for power purposes or for irrigation. Where differences of elevation of water surface exist, locks form an essential feature of their construction. The common form of lock is old. The first lock built in the United States was at the Sault Ste. Marie; it was constructed in 1797-8.

(1) The *Natural Fairway* is well illustrated by the main channel of approach to a harbor. The Ambrose Channel entrance to the harbor of New York affords a minimum depth of a little more than 40 ft. and a width of about 2,000 ft. It extends from deep water off Sandy Hook about 8,000 ft., to that part of the old channel leading to the inner port or harbor of New York City, where the deepest draft ships in ocean commerce berth for discharging and taking on cargo. The channel was dredged through firm material, and the balance between the harbor prism and tidal velocity is such that the channel practically maintains itself.

(2) *The Canalized River*; (3) *the Artificial Canal*.—These two types may conveniently be considered together, as both are frequently found in a single canal line, as in the *Barge Canal of the State of New York*. The history of the New York State Barge Canal dates back to 1825, and the canal has been in active operation practically throughout the entire period of its existence. It includes all the structures required in a lock canal, a considerable portion of which lies in a canalized river.

The original Erie Canal was about 323 m. long, with one terminus at Buffalo, on Lake Erie, and the other at Albany, on the Hudson River.

The length of the improved canal, known as the Barge Canal, from Waterford on the Hudson River to Tonawanda near Buffalo is 339 m., throughout the length of which there are 35 locks, exclusive of the U. S. Government lock in the Hudson River a short distance below Waterford. The lifts of these locks vary from 6 ft. to 34 1-2 ft. The entrance to the canal at Waterford is from the Hudson River and from there it is about 7 m. to the entrance into the canalized Mohawk, at which point the water surface is about 169.5 ft. above the Hudson. The total length of the improved Barge Canal system, including 10 m. of canal harbors, is 525 m., of which 382 m. is in canalized rivers and lakes. The total freight carrying capacity

of the Canal is estimated at about 20,000,000 tons annually. The State of New York imposes no tolls for the use of the canal. It is a free waterway.

The Panama Canal is another example of a canal which consists in part of a canalized river. The northern part of the Panama Canal is in reality along the canalized Chagres River, the canalization consisting of Gatun Lake, the descent from which, on the n., is accomplished by the Gatun locks built in the Gatun dam. See PANAMA CANAL.

The Manchester Ship Canal along the estuary of the River Mersey, before approaching the city of Manchester, England, is an example of canalization of an estuary. This canal, which is one of the prominent lock canals of the world, was formally opened by Queen Victoria in 1894. It has four sets of locks, and its length is 35 1-2 m. See MANCHESTER SHIP CANAL.

The St. Marys Falls Canal at the outlet of Lake Superior and inlet of St. Marys River, between the State of Michigan and Canada, exhibits the canalization of St. Marys Falls, while St. Marys River itself, below the locks, is a canalized river throughout a large part of its length, although no locks are found in it. The St. Marys Falls Canal is in reality a group of five canals with suitable approach channels. Four of these canals are on the American side of the falls and one on the Canadian side. Each has one lock built practically at the foot of the falls, so that a boat leaving any one of the locks finds itself in the improved channel below the falls.

(4) *Artificial Canals without Locks*.—Canals of this class are well typified by the Suez Canal, which connects the Red Sea with the Mediterranean. Inasmuch as these two seas are practically a part of the ocean, there is no material difference of level between them due to tidal or other action, though this is not necessarily the case where a canal connects two seas or oceans, as has already been observed in the discussion of the Panama Canal. The Suez Canal, therefore, is a sea-level canal. It has no locks, but has been excavated mostly in sand or sandy soil and requires terminal construction at each end, as well as protective works at other points. The total navigable length of the canal is nearly 100 m. The original depth was 27 ft., with a bottom width of 73 ft., but in 1885, following the recommendations of an international commission, improvements were begun which gave a minimum depth of 36 ft. and a bottom width of 213 ft. (on the straight parts), between Port Said and the Bitter Lakes and 250 ft. between Bitter Lakes and Suez, in-

creasing on curves to 267 ft. This type of waterway is the simplest of all, as no lock or controlling work is required.

(5) *Power Canals*; (6) *Irrigation Canals*.—It must be observed in considering class (5) that many canals with locks develop power for the purpose of operating those locks as well as for other purposes, by utilizing the fall of the water through the heights of the locks. This development of power on the line of canal locks has become practically standard, although if the water available to the canal should be reduced in quantity, as in a period of drought, there might not be a sufficient quantity for both traffic and power purposes.

A power canal, however, is more generally a waterway for the flow of water devoted to the sole purpose of generating power. There are many such canals, both in Europe and America. The canals at Holyoke and Lawrence, Mass., are prominent instances. The construction is simply that sufficient to bring the water from its maximum elevation to the point where the water-wheel receives it and generates the desired power. Regulating and controlling works are required, but they are of a simple nature. At Niagara Falls such waterways bring the water from the entrance of the canal at the river to the forbay, from which it enters the downturn tube leading to the water-wheels, transforming the energy due to the pressure and velocity of the water. See WATER POWER.

There are many waterways in the western parts of the United States which carry water for miles for the purpose of irrigating large tracts of desert land, which thus become extraordinarily productive. Some of these waterways compare in cross section with ordinary lock canals for traffic, but the majority of them are much smaller. Many large reservoirs, like the Roosevelt reservoir in Arizona, are created for the purpose of irrigation only. Irrigation canals, both main trunks and secondary canals, may either be open, like an ordinary canal, or closed, as with riveted steel plates, or they may be of Redwood staves with steel bands. See IRRIGATION.

Watkins Glen, New York, at the southern end of Seneca Lake, 21 m. n.w. of Elmira. Famous for its scenery, it was made a State reservation in 1906. Glen Springs, and the Glen Springs Sanatorium are here; p. 3,052.

Watling Island, one of the Bahama Islands, supposed to be the San Salvador of the first landing of Columbus.

Watling Street, one of the great Roman highways of Britain, commencing at Dover thence northward in two branches to the

neighborhood of Newcastle. Traces of the ancient road are still to be found; a street in London retains its name.

Watson, John (1850-1907), better known by his pseudonym 'Ian Maclaren,' British author. He lectured extensively in America and died at Mt. Pleasant, Ia., while on a lecture tour. He is the author of *Beside the Bonnie Brier Bush* (1894), which attained great popularity, and other books.

Watt, the practical electric unit of power, named for James Watt. It equals 10^7 c.g.s. electromagnetic units of power, and is the power used when a current of one ampere passes through a resistance of one ohm or in a direct current circuit when a current of one ampere passes through a circuit whose ends differ in potential by one volt. Watts are the numerical product of volts, amperes, and power factor.

Watt, James (1736-1819), Scottish engineer, the improver and generally reputed inventor of the steam engine. While working on a model of the Newcomen fire (steam) engine sent to him to repair, Watt conceived the idea of an engine in which condensation should take place in a vessel separate from the cylinder. Watt made many further improvements on the steam engine, including the expansion principle, parallel motion, and sun and planet motion, and finally the application of the governor, and with his partner built up a large and remunerative business. In addition, Watt was an ardent student of chemistry.

Watteau, Antoine (1684-1721), French genre painter, was born in Valenciennes. Watteau was particularly successful in the portrayal of conventional shepherds and shepherdesses, *fêtes champêtres*, and rustic dances. The gayety of his art lies mainly in his sunlit colors and great purity of tone; its beauty in his grace of line and delicate arrangement of background.

Watterson, Henry (1840-1921), American journalist, was born in Washington, D. C., where his father was a member of Congress. With W. M. Haldeman he founded the *Louisville Courier-Journal* in 1868, soon making it one of the most important political newspapers of the South.

Wattour, the common unit of energy. It is the energy used by a device taking one watt for one hour. One wattour = 60 watt sec. = 60 joules. 1000 wattours = 1 kilowatt hour.

Wattmeter, an instrument for measuring electrical power, or the rate at which work is being done between two points in a circuit.

Watts, Isaac (1674-1748), English hymn writer, was born in Southampton. The best of his sacred lyrics—simple, direct, and warmly

evangelical—rank among English classics. His collected Works (6 vols.) appeared in 1753.

Waukegan, city, Illinois, on Lake Michigan, a residential and manufacturing suburb of Chicago and popular as a summer resort. The place was first settled in 1835 and known as Little Fort until 1849. In 1859 it was incorporated as a city; p. 39,946.



James Watt.

(Portrait by Sir W. Beechey.)

Waukeasha, city, Wisconsin, 16 m. s.w. of Milwaukee. It is one of the most important summer resorts in the Northwest. An important industry is the exporting of the medicinal waters which abound in the vicinity. Many prehistoric, probably Indian, mounds still exist in the vicinity. The first settlement was made in 1834; p. 21,233.

Wave, an undulating motion due to a variety of causes. The most familiar kind of wave is the wave or ripple of water, which is obviously a state of motion passing over the surface of the water with a certain speed.

When we pass to the case of solids, we have to do with two kinds of elasticity—the rigidity, or resistance to change of form, and the incompressibility, or change of bulk. Thus there is a purely distortional wave, whose velocity depends upon the rigidity of the material; and there is a compressional wave, whose velocity depends upon both the rigidity and the compressibility. In addition to these there is a third type of wave, which travels along a thin, long bar of the material, say a copper or iron wire. This may be called the longitudinal

wave. Its velocity is always higher than the velocity of the distortional wave, and may be higher than that of the compressional wave. Lord Rayleigh has also pointed out the existence of a surface wave propagated along the face of an extended elastic solid. This surface wave has never been observed, except possibly in the case of earthquakes.

WAVES, Women's Auxiliary Volunteer Emergency Service, in World War II.

Wax, a term applied to various substances derived from the animal, vegetable, and mineral kingdoms, which generally are lighter than water; melt on heating to a limpid liquid, and are combustible, being not unlike fats, but harder and more lustrous in appearance. They are insoluble in water and cold alcohol, but are more or less soluble in boiling alcohol, ether, chloroform, petroleum spirit, and turpentine, and are normally white, although some of them—such as beeswax, laurel wax, carnauba wax—contain in their crude form a little coloring matter. In chemical composition the animal and vegetable waxes are, as a rule, formed by the union of fatty acids and alcohols of high molecular weight, while the mineral waxes are hydrocarbons. The most important waxes are beeswax, a secretion of bees; Chinese wax, produced by the attacks of an insect; Japan wax, from the seeds of a plant; Brazilian wax, a complex mixture of high alcohols, acids, and hydrocarbons from the leaves of a plant and myrtle wax, from the berries of *Myrica cerifera*. Spermaceti is a hard, very glistening, pearly wax, found in the head of the sperm whale, *Physeter macrocephalus*. Ozokerite is a natural hydrocarbon wax, largely used in candle-making. Paraffin wax is also a hydrocarbon, one source being petroleum. It is chiefly used for the manufacture of candles, in making waxed papers, and as an insulator. Waxes are also employed in the finishing of textile fabrics, making of ointments, pomades, furniture polishes, and medicinal plasters, as well as for laundry and household uses. Consult *Animal and Vegetable Fixed Oils. Fats, Butters and Waxes*.

Waxwing, a bird of the passeriform family which consists of a single genus and three species. In the typical species several of the secondary feathers of the wing, and in some cases some of the tailfeathers, have red wax-like tips at the shafts. Waxwings are small arboreal birds with soft grayish brown plumage and black markings on the head and chin. The wings are slate colored. They feed on insects and berries and are tame and gentle. The largest and handsomest species is the Bohemian Waxwing, found in the northern parts

of the Northern Hemisphere. The cedar Waxwing, Cedar bird, or Cherry bird is common throughout temperate North America. It is smaller but otherwise very similar to the Bohemian Waxwing. The third species is the Japanese Waxwing.

Wayne, Anthony (1745-96), American soldier, was born in Easttown, Pa. He commanded various forces during the Revolution, and served under Lafayette against Cornwallis in 1781 and later in the capture of the British army at Yorktown. He was elected to the Pennsylvania Assembly in 1794; was a member of the Georgia convention that ratified the Federal Constitution; and served in Congress from 1791 until 1792, when he was then appointed general-in-chief of the army, and chosen by President Washington to conduct a campaign against the northwestern Indians. Wayne was unquestionably one of the ablest soldiers of the Revolutionary period; he was known by the sobriquet of 'Mad Anthony.'

Ways and Means, Committee of, a committee of the U. S. House of Representatives to which are referred for consideration all measures affecting the national revenues. Down to 1865 the Committee of Ways and Means also had charge of appropriation bills.

Weakfish, or **Squeteague**, sometimes called 'Sea Trout,' a fish which abounds along the sandy shores of the Atlantic Coast from Cape Cod to Florida, and is caught for market in large numbers in spring and early summer, its spawning season. It is a greenish brown above, silvery below, with irregular brownish spots; average weight about five pounds.

Wealth. The word is derived from the Anglo-Saxon *weal*, well being. In economics the simplest definition which emerges is that 'Wealth consists of commodities which can be appropriated, and which have value in exchange.' Thus, one of the primary essentials of life, pure air, is intrinsically but not economically wealth, for while it 'avails towards well being,' it cannot be appropriated, and has therefore no exchange value. On the other hand, a tawdry print, which may actually degrade well being, is economically 'wealth,' because it can be sold for a penny, and therefore has value in exchange. Economic 'wealth' is a purely commercial term which has no necessary relation to well being. It could only become synonymous with well being in a society in which commercialism had been overthrown.

Weasel, a small carnivorous animal of the Weasel family, which includes the marten, badger, otter, mink, and polecat. In general the body is from six to eight inches in length, much elongated, being especially adapted to

worming its way through dense herbage or into holes in search of prey. The head is small, the neck long, the legs short, and the tail about one-fourth to one-third the length of the body. The color is a mahogany brown above and white below, changing in winter, in species dwelling in cold climates, to pure white except for the black tail tip. It is a tireless hunter, feeding on rats, mice, moles, shrews, and field mice, and occasionally attacking young rabbits and birds.



Weasel.

Weather, the general atmospheric conditions at any definite time, including temperature, precipitation, cloud and sunshine, humidity, and winds. It varies from day to day, and is to be differentiated from climate, which denotes the average weather conditions over a considerable period. In general the weather and its variations may be said to be due to the motion of the earth's lower atmosphere. In the temperate zone, which lies in the



Daniel Webster.

belt of the prevailing westerlies, the controlling factors are the paths of cyclones, or areas of low pressure, and anticyclones, or areas of high pressure.

Consult *Bulletins* of the U. S. Weather Bureau.

Weather Bureau, U. S., is a bureau of the Department of Agriculture, created in 1891 for the purpose of continuing and developing the meteorological work carried on, since 1870, by the Signal Service of the army. It is charged with the forecasting of the weather; the issue of storm warnings; the display of weather and flood signals for the benefit of agriculture, commerce, and navigation; the gauging and reporting of rivers; the maintenance and operation of sea coast telegraph lines, and the collection and transmission of marine intelligence for the benefit of commerce and navigation; the reporting of temperature and rainfall conditions for the cotton interests; the display of frost, cold wave, and other signals; the distribution of meteorological information in the interest of agriculture and commerce; and the taking of such meteorological observations as may be necessary to establish and record the climatic conditions of the United States, or are essential for the proper execution of the foregoing duties.

The Weather Bureau is probably best known through the work of the Forecast Division, by which the daily forecasts and weather maps are issued. These forecasts, containing predictions from twenty-four to thirty-six hours in advance, are based upon simultaneous observations of local weather conditions taken daily at 8 A.M. and 8 P.M., seventy-fifth meridian time, at about 200 regular observation stations scattered throughout the United States and the West Indies. Observations are telegraphed, in a special cipher code for the sake of economy, accuracy, and simplicity, to the Central Office at Washington, and to the central stations, where forecasts for the respective districts are made and telegraphed, within two hours from the taking of the observations, to about 1,600 distributing points, whence they are further disseminated by telegraph, telephone, wireless, and mail. By a system of interchange with the weather bureaus of Canada and Mexico daily reports are received from a number of stations in those countries. Under normal conditions daily observations are also received from many other countries.

The various agricultural services of the Bureau are grouped together in the Division of Agricultural Meteorology. Special bulletins and warnings are issued in the corn and wheat regions, the principal cotton States, the rice growing region of Texas and Louisiana, the sugar district of the Southern States, the various fruit growing regions, the tobacco and alfalfa districts, and the cattle range district of

the Southwest, and special rain and temperature forecasts are furnished for sheepmen during the shearing and lambing seasons. The division issues a *National Weather and Crop Bulletin*, a *Snow and Ice Bulletin*, the *Monthly Weather Review*, the *Annual Report* of the Chief, and occasional *Bulletins* on various meteorological subjects. Weather services similar to that of the United States are maintained in practically all civilized countries.

Weatherford, William (c.1780-1826), Creek Indian chief, son of a white man by a half-breed squaw. After the final defeat of the Creeks at Horseshoe Bend, on March 27, 1814, Weatherford surrendered to General Jackson, and afterward settled on a plantation at Little River, Ala.

Weathering, the result of the changes, mechanical and chemical, produced by the action of the atmosphere on exposed rock surfaces. See *EROSION*.

Weaving is the art of forming a web or cloth by the intersecting of two distinct sets of fibres, threads, or yards. The one set of yarns which pass in a longitudinal direction from end to end of the web is called the warp; the yarn which crosses and intersects the warp at right angles is called the weft or woof. Textures made by knotting, twisting, and knitting are distinguished from woven fabrics by the fact that the yarns in these proceed in the same direction or have similar functions, while in knitting one continuous thread alone is used.

Webb, Matthew (1848-83), known as Captain Webb, English Channel swimmer, succeeded on the second attempt, Aug. 24, 1875. To maintain a waning popularity, he undertook to swim the rapids and whirlpool of Niagara, and perished in the attempt.

Webster, Daniel (1782-1852), American statesman, lawyer, and orator, born in Salisbury, N. H. He rapidly achieved distinction at the bar, and was elected to Congress in 1812, his second term ending in 1817. He then removed to Boston and entered practice. His first great case (1818) in the Supreme Court was the Dartmouth College case in which he maintained successfully that the charter of a corporation was a contract, the obligation of which could not be impaired by the states, and that the phrase in the Constitution, 'the law of the land,' did not mean any law that a legislature might pass, but law which was in conformity to the requirements of the Constitution. Webster soon became one of the leading American orators, as he was already recognized to be in the front rank of Constitutional lawyers. He had a presence to which the epithet 'godlike' was

habitually applied during his lifetime. His eye was piercing, his voice of extraordinary compass and flexibility.

In 1822 he was elected to the House of Representatives from Boston, and was re-elected in 1824. In 1827 he was elected to the Senate from Massachusetts, and served until 1841. Webster was Secretary of State, 1841, under Harrison, continuing under Tyler until the ratification of the Ashburton treaty, when he resigned and returned to his practice at the bar. In 1845 he was again elected to the Senate from Massachusetts, and served until 1850.

Webster died at his home in Marshfield, Mass., on Oct. 24, 1852. Never, perhaps, in the history of the country was there a more general expression of sorrow. The only other cases which can be compared to it, were the demonstrations following the death of Washington and the death of Lincoln. These three men certainly did more than any other citizens to shape the destinies of the United States. To Webster we owe it especially that he convinced the Supreme Court and the people of the United States that the Federal government was a Union; that it had all powers necessary to its maintenance and preservation; that whenever a power is granted in the Constitution, everything reasonably and fairly involved in the exercise of that power is granted also; that the instrumentalities of the national government are free from adverse legislation by the states; that freedom of commerce between the different states is sacred; that Congress has power to regulate the entire passenger traffic to and from the United States. Without the establishment of these the Union would long since have been dissolved.

Webster, John (c.1581-c.1626), English dramatist, was author of Senecan tragedies, of which *The White Devil* (1612) and *The Duchess of Malfi* (1616) are best known.

Webster, Noah (1758-1843), American lexicographer. His 'blue-back' spelling book (1783-5) remained in popular use for several generations. It is said that his family lived on the proceeds of this spelling book during the twenty-five years he was occupied in preparing his *American Dictionary of the English Language*.

Wedgwood, Josiah (1730-95), English potter, was born at Burslem, in Staffordshire, where in 1759 he set up in business for himself. He may be said to have created English pottery. He patented a cream-colored porcelain, which from Queen Charlotte's appreciation of

it became known as queen's ware; and he induced the sculptor Flaxman to furnish him with classical designs for what is still known as Wedgwood-ware—white cameo reliefs on a blue or biscuit-brown ground.

Weed, Thurlow (1797-1882), American journalist and politician, was born at Cairo, N. Y. After a successful career as a newspaper man he founded in 1836 the *Albany Evening Journal*, which he controlled and edited for more than thirty years. In 1861 he was sent to Europe with Archbishop Hughes of N. Y. and Bishop McIlvaine of Ohio, to prevent, if possible, European intervention on behalf of the Confederacy. In 1867 he became editor of the *New York Commercial Advertiser*, but resigned on account of ill-health. He was an early opponent of slavery and of imprisonment for debt, and a supporter of internal improvements and state banks. The introduction of Croton water into New York City, the metropolitan police system, Central Park, the harbor commission, and the immigrant station at Castle Garden were municipal enterprises which he actively aided.

Weehawken, township, New Jersey, connected with New York City by ferry. It is of importance as a railroad terminal and there are large wharves for ocean steamers; p. 14.363.

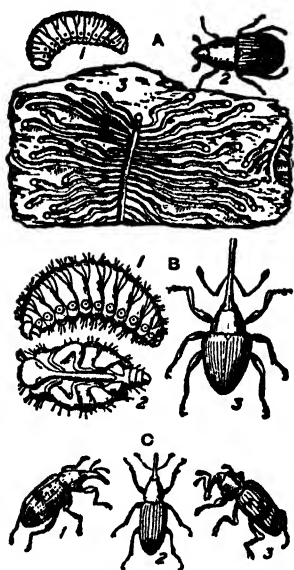
Week, the period of seven days, now in general use as a division of time, is of Hebrew or Chaldaean origin. It has been generally regarded as a memorial of the creation of the world, according to the Mosaic account, in that space of time; but it is also the most obvious and convenient division of the lunar or natural month. From the Saxon designations of the planets have been formed the modern names of the days of the week—Saturday (Saturn), Sunday (Sol), Monday (Moon), Tuesday (Tiu, the Saxon Mars), Wednesday (Woden, or Mercury), Thursday (Thor, or Jupiter), and Friday (Frygga, or Venus).

Weeks, John Wingate (1860-1926), American legislator and Cabinet official, born in Lancaster, N. H. In 1913 he entered the U. S. Senate, and in 1921 he became Secretary of War in President Harding's Cabinet.

Weems, Mason Locke, 'Parson', (c. 1760-1825), American clergyman and writer, was born in Dumfries, Va. He is chiefly remembered for his popular *Life of Washington*, which was first published in 1800, and which has run through scores of editions. The fifth edition (1806) was greatly expanded, and in this first appeared the cherry tree anecdote and others equally apocryphal and almost equally well known.

Weeping, an emotional disturbance characterized by short, deep inspirations, long expirations with the glottis narrowed, relaxed facial and jaw muscles, and copious excretion of tears.

Weevil, a general name for a large number of beetles belonging chiefly to the suborder Rhyncophora, of which some 25,000 species are known. They are characterized by the prolongation of the anterior part of the head into a snout or proboscis, generally used by the female as an ovipositor and by both sexes for boring. The larvæ are white, footless grubs, and with few exceptions are destructive to vegetable life.



Weevils.

- A. *Scolytus*: 1, larva; 2, imago, 3, borings in bark by larva.
 B. *Balaninus*: 1, larva; 2, pupa; 3, imago. C. A group of common weevils: 1, apple-blossom weevil; 2, corn weevil; 3, pine weevil.

Several families are distinguished, the Curculionidae being the most important. Familiar forms of this group are the Chestnut Weevil, Large Chestnut Weevil, and Pecan or Hickory Nut Weevil. The adult, a small, yellowish insect 1-2 to 2-3 of an inch in length, punctures the husk or bur of the young nut, and deposits the eggs within. Here they hatch and the grub matures, ready to eat its way out when the

nuts fall. Frequent and regular gathering are the best preventive measures.

A great number of weevils destructive to fruit are also included in this family. Control measures include spraying with arsenate of lead, clean farming, pruning, and thorough cultivation. Other important varieties are the notorious Boll Weevil, several kinds of Clover Leaf Weevil, and the Alfalfa Leaf Weevil. See BOLL WEEVIL.

Weights and Measures. All measurements consist in finding out how many times an unknown quantity contains some known quantity of the same kind. The abstract quantity, in terms of which the measurement is expressed, is called a *unit*. A concrete representation of a unit is called a *standard*. Units are of two kinds—simple and derived. The yard, for instance, is a simple unit; and the square yard, being obtained from the first, is a derived unit.

The *International Bureau of Weights and Measures* was established in 1875 near Sèvres in the environs of Paris, France, under a convention signed by the delegates of seventeen nations, for the purpose of constructing, restoring, and verifying new metric standards to replace the standards determined upon in 1799. Under the direction of the Bureau, international prototype standard metres and kilograms of iridio-platinum were adopted and deposited in the Observatory of the Bureau, and national prototypes were prepared and distributed to the contracting states. The laboratories of the Bureau are specially constructed to insure absolute stability and freedom from vibration, heated and ventilated in such a manner that a constant temperature is maintained, and equipped to make determinations of pressure, temperatures, etc., with the highest degree of precision.

The fundamental units in common use in the United States to-day are the yard as the unit of length; the pound avoirdupois and the pound troy as units of weight; and the gallon as unit of capacity. The legal standards fixing these units are carefully preserved at the National Bureau of Standards, and certified copies are supplied to localities. From the simple units named, other units are derived, connected with the former by some easy arithmetical relation.

In 1913 Congress enacted the so-called Net Weight Law, which became effective in May, 1914, compelling manufacturers to make a clear statement of the weight, volume, or contents of all packages of food shipped in interstate commerce, or sold in the District of Columbia or the Territories. The regulations, in general, require that the manufacturer of

foods shall plainly mark all packages, bottles, or other containers holding more than 2 ounces avoirdupois or more than 1 fluid ounce to show the net weight or volume of the contents.

The subjoined tables show the principal units of length, volume, and weight established in the United States, although numerous local divergencies exist, due to the fact that the State laws and the usages of commerce do not always strictly adhere to national usage.

Common Linear Measure.

12 inches	= 1 foot.
3 feet	= 1 yard.
5½ yards	= 1 rod, pole, or perch.
40 rods	= 1 furlong.
8 furlongs	= 1 mile.
3 miles	= 1 league.
1,760 yards	= 1 mile.

Special linear units are the *hand*, used in measuring horses, = 4 inches; the *fathom*, used in measuring ropes, soundings, etc., = 6 ft.; the *chain* = 100 links = 66 ft., used in surveying; the *knot* = 6,080 ft., used in nautical work.

Square or Land Measure.

144 square inches	= 1 square foot.
9 square feet	= 1 square yard.
30¼ square yards	= 1 square rod.
40 square rods	= 1 rood.
4 roods	= 1 acre.
640 acres	= 1 square mile.
10 square chains	= 1 acre.

Cubic or Solid Measure.

1,728 cubic inches	= 1 cubic or solid foot.
27 cubic feet	= 1 cubic or solid yard.
128 cubic feet	= 1 cord.

Dry Measure.

2 pints	= 1 quart.
4 quarts	= 1 gallon.
2 gallons	= 1 peck.
4 pecks	= 1 bushel.

The U. S. bushel is 2,150.42 cubic inches, as compared with the British bushel, which is 2,218.192 cubic inches.

Wine Measure.

4 gills	= 1 pint.
2 pints	= 1 quart.
4 quarts	= 1 gallon.
63 gallons	= 1 hogshead.
2 hogsheads	= 1 pipe or butt.
2 pipes	= 1 tun.

The U. S. standard liquid gallon is 231 cubic inches, the British imperial gallon 277.274 inches. The legal barrel in most States is 31½ gallons; in some, 32 gallons.

Avoirdupois Weight.

27.34375 grains	= 1 dram.
16 drams	= 1 ounce.
16 ounces	= 1 pound.
100 pounds	= 1 hundredweight. [cwt.]
20 cwt.	= 1 ton.

The long ton (= 2,240 lbs.) is generally used only for coal and minerals in the United States; the commercial ton is 2,000 lbs.

Troy Weight.

24 grains	= 1 pennyweight.
20 pennyweight	= 1 ounce. [dwt]
12 ounces	= 1 pound.

Troy weight is now restricted to gold, silver, and jewels, except pearls and diamonds, which are weighed in carats (1 carat = 3.16831 grains troy).

Apothecaries' Weight.

20 grains or minims	= 1 scruple.
3 scruples	= 1 drachm.
8 drachms	= 1 ounce.
12 ounces	= 1 pound.

Apothecaries' Fluid Measure.

60 minims	= 1 drachm (3 i).
8 drachms	= 1 ounce (3 i).
16 ounces	= 1 pint (O i).
8 pints	= 1 gallon (C i).
* Approximately, 1 minim = 1 drop; 1 drachm = 1 teaspoonful; a fluid ounce = 2 tablespoonfuls; 2 ounces = 1 wineglassful.	

Measures of Time.

The unit of time for practical purposes is the mean solar day, which runs from one midnight to the next.

60 seconds	= 1 minute.
60 minutes	= 1 hour.
24 hours	= 1 day.
7 days	= 1 week.
4 weeks	= 1 (lunar) month.
365 days	= 1 year.

This table is only approximately correct; the solar year really consists of 365.2422 days. To make good the difference, every fourth year contains 366 days. But this is slightly in excess of what is required, hence every hundredth year contains only 365 days. For scientific purposes the unit of time is the sidereal day, which is defined as the interval between two consecutive arrivals of a certain fixed star at the meridian.

Metric System.

In this system the unit of length is the metre, which is equal to 39.37 inches, and is divided into tenths (decimetres), hundredths (centi-

metres), and thousandths (millimetres). Approximately, 1 inch = 2.5 centimetres. The unit of capacity is the litre or cubic decimetre, which is equal to 1.7598 pint. The unit of mass is the gram, which is defined as the mass of a cubic centimetre of water at 4° C. in the latitude of Paris. Its weight in grains is 15.432. See METRIC SYSTEM.

Angular or Circular Measures.

The divisions of the right angle are:

60 seconds (60'') = 1 minute (1').
60 minutes = 1 degree (1°).
90 degrees = 1 right angle.
360 degrees = 1 circumference.

Wei-hai-wei, British naval and coaling station, on the n. e. coast of Shantung Peninsula, China. The chief exports are ground nuts and ground-nut seeds. Its excellent climate makes it a summer resort for Europeans.

In 1883-5 Wei-hai-wei was first fortified by the Chinese. During the war between Japan and China, on Feb. 9, 1895, the Japanese captured the town, and entirely destroyed the Chinese fleet. In 1898 it was evacuated, and shortly afterward was leased by Great Britain; p. 147, 177.

Weimar, town, Germany, capital of Thuringia, is situated on the River Ilm. It is of interest chiefly because of its rich literary associations, Goethe, Schiller, Herder, and Wieland having been associated with it under the patronage of the Grand Duke Charles Augustus, who made it the centre of German letters; p. 45, 957. The first National Assembly of the German Republic was held in Weimar in 1919 and adopted the democratic constitution which guided the Reich until the rise of Adolf Hitler's Nazi dictatorship.

Weir, in general, a type of dam with its top and lower face so constructed as to permit the water to overflow its crest.

Weismann, August (1834-1914), German biologist, was born at Frankfort-on-the-Main. He was one of the first German scientists to lend public support to the Darwinian theory, and after 1884, when the partial failure of his eyesight forced him to give up microscopic work, he devoted himself almost wholly to problems of heredity and evolution.

Weismann's conception of heredity centres about his theory of the germ plasm, which he held to be absolutely continuous from the present generation back to the earliest generations of living things, and to be also genetically distinct from the somatoplasm of the body. This theory is tantamount to a statement of entire scepticism in regard to the inheritance of

acquired characters. His theory of evolution, a natural outgrowth of his theory of heredity, made evolution dependent upon evolution of the germ plasm, which is brought about 'chiefly, if not wholly, by the mixture of different kinds of germ plasms (amphimixis) in the union of the sex cells.'

Weissenfels, town, province Saxony, Prussia. It has manufactures of machinery, boots, and paper. Coal is mined; p. 40,000.

Weizmann, Chaim (1874-1952), first pres. Repub. of Israel, 1949-52; b. Motele, Russ.; ed. Univs. Berlin and Freiburg.

Welch, Ashbel (1809-82), civil engineer, b. Nelson, N. Y. Pres. of United Railroads and Canals of N. J., 1867, for which he devised what has since become the block system for controlling movement of trains.

Welch, William Henry (1850-1934), American pathologist, was born in Norfolk, Conn. In 1901 he became president of the board of directors of the Rockefeller Institute for Medical Research.

Welding, the process of uniting materials by pressing or hammering them together when in a more or less plastic stage. This plasticity is usually brought about by raising the temperature; but it may occur under the influence of pressure alone, as in the union of metallic particles into a homogeneous mass. Welding is done by the Thermit process, by the oxyacetylene flame, and by electric current.

Welland Canal, a Canadian ship canal between Lakes Erie and Ontario, by means of which navigation is carried around the Niagara Falls and Rapids. It is 26 3-4 m. in length, has 26 locks, 270 ft. by 44 ft., and is navigable by vessels drawing 14 ft.

Welles, Gideon (1802-78), American public official, was born in Glastonbury, Conn. He became a Republican on the organization of that party, and in 1861 was appointed Secretary of the Navy in President Lincoln's cabinet.

Welles, Sumner (1892-), U. S. author, statesman, and expert on Pan-American and world affairs, was born in New York City. He was appointed assistant secretary of state in 1933, and under-secretary of state in 1937. He resigned in 1943. See his book, *The World of the Four Freedoms* (1943).

Wellesley, town, Mass.; the seat of Wellesley College, of Dana Hall school for girls, and the Academy of the Assumption; p. 15, 127.

Wellington, city, capital of New Zealand. Victoria College, affiliated with the University of New Zealand, is located here. Its industries are many and varied; p. 116, 700.

Wellington, Arthur Wellesley, First Duke of (1769-1852), British general and

THE BOY WATT MAKING HIS FAMOUS EXPERIMENT WITH STEAM

statesman, leader of the forces defeating Napoleon at Waterloo. His military powers, not at first brilliant, were proved at Assaye (1803), where he exhibited for the first time his capacity in offensive tactics, and won a decisive battle. Wellesley's chief value, however, in India in these years were his sagacity, moderation, and integrity, which enabled him to greatly purify and improve the Indian civil service.

His conduct of military campaigns showed profound insight, resolute constancy, military capacity of a high order, and powers of organization that deserve unqualified praise. He had remarkable confidence and readiness in the field, but strategy was never his strong point. He was respected but not beloved by his officers and men. He was employed in several great diplomatic trusts and in 1828-30 was made prime minister, an office to which he was temperamentally unfitted.

As a statesman Wellington far excelled Marlborough, though he does not rank with Canning and Peel; but for a quarter of a century he was a main pillar of the state.

Wells, Sacred, small bodies of water held in veneration. The reverence formerly paid to fountains and springs by most of the races of the Old World was only one of several manifestations of the worship of nature. Among the Greeks and the Romans each river had its tutelary god or goddess. The nymphs were specially worshipped as the divinities presiding over springs, and offerings were made to the spirits of these various fountains. Some were specially known as 'wishing-wells,' it being supposed that a wish solemnly made when depositing an offering would be fulfilled within the year. At certain wells, known as 'cursing wells,' the wish took the form of a prayer for the death or the injury of an enemy. Many of the wells possess therapeutic properties, and this may have formed the basis of the belief that all or most of the wells regarded as sacred were efficacious in curing disease. Consult Spence's *Introduction to Mythology* (1921).

Wells, Herbert George (1866-1946), English novelist, was born in Bromley, Kent. In 1893 he settled in London and devoted himself to literature, in which field he has won fame as one of the leading novelists of his day. His work may be generally divided into three classes: scientific romances; sociological novels; and realistic novels. The first class includes *The Time Machine* (1895), *The Invisible Man* (1897), *The Food of the Gods* (1904). Among the sociological works are

Mankind in the Making (1903), *A Modern Utopia* (1905), *New Worlds for Old* (1908), and *The World Set Free* (1914). But probably Wells' most lasting fame will rest upon such realistic fiction as *Kipps* (1905), *Tono-Bungay* (1909), *The Research Magnificent* (1915), *Mr. Britling Sees It Through* (1916), *Joan and Peter* (1918), *The World of William Clissold* (1926), *The Bulpington of Blup* (1933). A work not to be included in any of the above classes, which attained great popularity is *The Outline of History* (1920). *The Science of Life*, followed in 1929. Other writings include *The Undying Fire* (1919), *Men Like Gods* (1923), and several volumes of short stories. In 1934 he published his *Experiment in Autobiography*. In March, 1935, he visited America to survey the New Deal for *Collier's Magazine*. In the same year his novel *Things To Come*, appeared. This book was screened. Wells spent five weeks in Hollywood at the close of 1935 observing the process of production. In September, 1936, Wells joined the British Academy for the Advancement of Science. In 1937 his *The Croquet Player* appeared.

Wells, Horace (1815-48), American dentist, was born in Hartford, Vt. In 1841-43 he joined Dr. W. T. G. Morton in business in Boston. About 1840 he began experimenting with nitrous oxide gas as an anaesthetic in surgical operations, and in 1845 practically demonstrated its efficiency in the Harvard Medical School.

Wen, a term popularly applied to any protuberant superficial tumor. It is, however, cystic distention of a sebaceous gland after occlusion of its duct.

Wenceslaus, or **Wenzel** (c. 908-935), patron saint of Bohemia. He was converted to Christianity and after ascending the throne of Bohemia was assassinated by his brother Boleslas, because he attempted to Christianize his people.

Wenchow, city and treaty port, China. It is encircled by a wall and has a Buddhist monastery dating from the 9th century; p. 631.000.

Wende, a name applied to a Slav community in Upper and Lower Lusatia. Their language, of which there are two marked dialects—the Saxon and the Prussian—with numerous local and half-Germanized varieties, holds an intermediate position between Polish and Czech (Bohemian), and was first reduced to written form in the 16th century.

Wentworth, Benning (1696-1700). During 1741-67 he was royal governor of New

Hampshire. After entering upon the office he began making grants of land in what is now Vermont with the result that a long controversy sprang up with New York, which also claimed the territory on the strength of the charter issued in 1674 by Charles II. to the Duke of York. By exacting heavy fees for land grants and by other means Wentworth accumulated a fortune large for the times. He afterwards gave 500 acres of land, which was used as the site for Dartmouth College.

Wentworth, Sir John (1737-1820), American colonial governor, was born in Portsmouth, N. H., a nephew of Benning Wentworth. During his administration he was at first very popular; he did much for the settlement of the country and for education; and granted Dartmouth College its charter and 44,000 acres of land.

Weregild, in Anglo-Saxon and Teutonic law, a fine or pecuniary compensation prescribed for homicide or other crime against the person, pain to the relatives of the deceased, or, in the case of injury, to the person wounded.

Werfel, Franz (1890-1945), novelist and playwright, was born in Prague. His plays, *The Goat Song* and *The Eternal Road*, have been produced in America. His novels include: *The Man Who Conquered Death* (1927); *The Forty Days of Musa Dagh* (1934). This novel of the Armenian defense of Musa Dagh against the Turks was hailed as a glowing plea for tolerance for racial minorities. *Embezzled Heaven* appeared, 1940, and *The Song of Bernadette*, 1942. Werfel came to the U. S. in the 1930's.

Wergeland, Henrik Arnoldus (1808-45), Norwegian poet. When only a little over twenty he composed what he regarded as his chief work, the epic *Skabelsen, Mennesket, og Messias*, which is marked throughout by original genius. His published works include the tragedy *Barnemorderen* (1835), *Jan van Huysum's Blomstestykke* (1840) *Jöden* (1842), *Hasselnödder* (1845).

Werne, Abraham Gottlob (1750-1817), German mineralogist and geologist. His theory, in which, roughly put, he held that rocks are primarily of aqueous origin, led to the controversy which divided geologists into two parties, styled Neptunists and Vulcanists. His writings include *Ueber die äussern Kennzeichen der Fossilien* (1764); *Neue Theorie Ueber die Entstehung der Gänge* (1791).

Wernigerode, town, Germany. There is a fine library in the old castle. Manufactures

chocolate, machinery, and cigars; p. 19,000.

Werrenrath, Reinald (1883-1953), baritone singer. In 1919 he appeared in the Metropolitan Opera House, in 'Pagliacci.'

Wesel, town, Prussia. The Willibrord church, one of the most beautiful of Gothic buildings, dates from the 12th century. Machinery, pottery, bricks, cloth, and soap are manufactured; p. 25,000.

Weser, river, Germany. It flows n. to Bremen and from there for 40 m. forms the boundary between Oldenburg and Prussia.

Wesley, Charles (1707-1788), English preacher and writer of hymns, brother of John Wesley, was educated at Christ Church, Oxford. His methodical ways earned the nickname 'Methodist,' which he later applied to a religious group.



John Wesley.

Wesley, John (1703-91), English religious reformer, the founder of Methodism, was born in Epworth, Lincolnshire. He went to Christ Church, Oxford. At the same college his younger brother, Charles Wesley (1707-88), had become a member of a religious society derisively called the 'Holy Club,' or 'Methodists,' among whose members were James Hervey and George Whitefield. John and Charles were at length prevailed upon to accompany General Oglethorpe to Georgia, to preach to the settlers and Indians. While in Georgia, John organized at Savannah what is said to have been the first Sunday-school established in America, and his first hymn-book was published in Charlestown in 1737.

On his return to England he found that the religious enthusiasm which passed by the name of Methodism had been much stimulated by the fervid preaching of Whitefield. The example of preaching in the open air, which Whitefield initiated, was followed by Wesley, while the first separate meeting house of the

Methodists was erected in the Horse Fair, near St. James' church, Bristol (1739). In July, 1740, John Wesley adopted that system of doctrine and practice now embodied in the standards of the Wesleyan Methodist, Primitive Methodist, and Methodist Episcopal churches.

From this date Wesley worked as an evangelist and missionary organizer. Until his death practically his whole time was given up to preaching, writing books, and travelling from place to place expounding the Word of God. He rarely preached less than three times and frequently as many as five times a day, while he generally rode about forty or fifty miles daily. His brother Charles at all times was his faithful coadjutor. During the years between 1743 and 1785 the organization increased by leaps and bounds, until it spread all over England. In 1785 Wesley made provision for its extension to America, by giving formal ordination to Dr. Coke, a presbyter of the Church of England, and the Methodist Episcopal church came into existence. The two Wesleys were not mere ecclesiastics. They were great social reformers and philanthropists.

Wesleyan University, an institution of learning in Middletown, Ct., founded 1831.

Wessel, Horst (1907-1930), author of the 'Horst Wessel Song' which became the battle hymn of the German Nazis.

Wessex, Kingdom of, an Anglo-Saxon kingdom in Southern Britain. In 494 Cedric landed on Southampton Water, and after years of warfare became king of the West Saxons, or Wessex. In 577, after the battle of Deorham, the West Saxons secured access to the Bristol Channel, and won Cirencester, Gloucester, and Bath. It was not, however, till the reign of Egbert (802-39) that the supremacy of Wessex over Northumbria and Mercia was in any sense assured. Nevertheless the union of England under Egbert was premature, and it required the Danish invasions to force the men of Northumbria and Mercia to recognize the overlordship of Wessex. There is now no such geographical division.

West, Andrew Fleming (1853-1943), American educator, was born in Alleghany, Pa.; educated at Princeton; was professor of Latin at Princeton (1883-1901); dean of Princeton Graduate School (1901-28); was known as the 'Dean of Classical Studies in America.' He wrote *Latin Grammar* (1902); *Education and the War* (1919).

West, Benjamin (1738-1820), American

historical painter, was born in Springfield, Penn., of Quaker parentage. Self-taught, at the age of sixteen he practised portrait-painting in the villages near Philadelphia, and painted for a gunsmith his first historical picture, *The Death of Socrates*. In Italy, he painted his *Cimon and Iphigenia* and *Angelica and Medora*. His *Agrippina landing with the Ashes of Germanicus* attracted the attention of George III., who was his loyal friend and patron for forty years, during which time he sketched or painted some 400 pictures. His *Death of General Wolfe*, painted in the costume of the period, against the advice of all the most distinguished painters, effected a revolution in the historic art of Britain. Among his best-known works are *Edward III. at Cressy*, *The Black Prince at Poitiers*, *Queen Philippa at Calais*, *Penn's Treaty with the Indians*.

West, Rebecca (Cecily Fairfield) (1892-), English novelist and critic, in 1930 married Henry Andrews. She wrote *The Return of the Soldier* (1918); *The Judge* (1922); *Harriet Hume* (1929); *Black Lamb and Grey Falcon* (1941).

Westcott, Edward Noyes (1847-98), American banker and novelist, was born in Syracuse, N. Y. In 1895 he devoted himself to writing *David Harum*. After numerous rejections it was accepted (1897) and on its publication, enjoyed wide-spread popularity.

Westerly, town, Rhode Island. It has cotton, woolen, thread, and printing press factories. Granite is quarried; p. 11,199.

Westermarck, Edward Alexander (1862-1939), Finnish scholar and anthropologist; professor at University of London; leading authority on marriage; author of *The History of Human Marriage*.

Western Australia, a state of the Australian Commonwealth. Its greatest length is 1,480 m.; greatest breadth, about 1,000 m. and the total area, 975,920 sq. m.; p. 466,000.

The chief products of the fertile southern section are wheat, oats, and wine. Fruit and vegetables are also grown. Dairy farming is a growing industry. Live stock is important, especially sheep. A source of great wealth is the forest timber. Gold, silver, lead, copper, tin, iron, coal, and gems are found. The state has a governor, a legislative council of 30 members, and a legislative assembly of 50 members. The chief cities are Perth, the capital; Kalgoorlie, the chief mining centre; and Fremantle, the most important port. The first Englishman who landed on the coast of what was then New Holland, on Jan. 5, 1688, was

Dampier. It was on May 2, 1829, that Captain Fremantle hoisted the British flag. In 1901 it became a state of the Commonwealth of Australia. See AUSTRALIA.

Western Reserve, a tract of over 3,000,000 acres on the south shore of Lake Erie, reserved by the State of Connecticut. Connecticut's claim to that part of her colonial grant included in the States of New York and Pennsylvania was abandoned before the close of the Revolution, leaving a vague claim to the w. of the Pennsylvania boundary, in a region also granted by charter to New York and to Virginia. In 1786 Connecticut followed the example of the other two States in ceding this indefinite territory to the United States, but reserved to herself a strip of land between latitudes 40° and 42° 2', and between the western boundary of Pennsylvania and a parallel line 120 m. to the w. The sale of the remainder in 1795 to the Connecticut Land Company afforded a school fund, the principal of which is still available. In 1796 the present city of Cleveland was founded, the first settlement of the Reserve. In 1800 the Reserve became a part of the Northwest Territory as Trumbull co.

Western Reserve University, a non-sectarian institution of learning at Cleveland, Ohio. Its collegiate department was founded at Hudson in 1826 as Western Reserve College, and was removed to Cleveland in 1882, when it was renamed Adelbert College in memory of Adelbert Stone, son of Amasa Stone, its benefactor. Women are admitted to all departments except Adelbert College.

Westfield, city, Massachusetts. Its industrial establishments manufacture boilers and radiators, bicycles and children's vehicles, textile machinery. Westfield was settled in 1658 and was called Woronoco. On its incorporation in 1669 its name was changed to Westfield; p. 20,962.

West Hartford, town, Connecticut. Industries include tobacco growing and dairying. Noah Webster was born here; p. 44,402.

West Indies, the great archipelago which extends in a vast curve from Florida in North America to the northern coast of South America, separating the Atlantic Ocean from the enclosed waters of the Mexican Gulf and the Caribbean Sea. The islands include several more or less well-defined groups—the Bahamas, Greater Antilles, Lesser Antilles (including the Leeward Islands and the Windward and Caribbee Islands), the Trinidad-Tobago group, and the Keys or coral reefs. Their total area is estimated at 100,000 sq. m., with a population of about 6,200,000.

Of these groups, the *Greater Antilles* are by far the most important, including the islands of Cuba, Puerto Rico, Haiti, and Jamaica. The climate of the West Indies is tropical, except in the Bahamas and on the temperate uplands of the larger islands. Agriculture is the chief industry, with sugar, tobacco, and coffee as leading products. The rainfall varies from 31 to 118 inches. The islands are subject to hurricanes in the autumn. The inhabitants are chiefly Negroes and mulattoes, except in Cuba and Puerto Rico (Spaniards and Americans) and Saba (Dutch). Politically, the West Indies are divided into the republics of Cuba and Haiti, the Dominican Republic, the American island of Puerto Rico, the British West Indies, French West Indies, Dutch West Indies, and the Virgin Islands (United States). For British West Indies see JAMAICA; BAHAMAS; BARBADOS; ST. VINCENT; TRINIDAD. For French West Indies see GUADELOUPE; ST. BARTHOLOMEW; MARTINIQUE; ST. MARTIN. For Dutch West Indies see ST. MARTIN. For Virgin Islands see VIRGIN ISLANDS; ST. THOMAS.

The West Indies were discovered in 1492-8 by Columbus, who believed them to be a part of India. First the Spaniards conquered the aborigines; then English, Dutch, French, and Danes strove for possession of them; and even pirates and buccaneers took part in the struggle. Here Morgan, Drake, Grenville, De Grasse, Rodney, Nelson, Albemarle, and others won victory or suffered defeat. African slaves imported to cultivate the sugar plantations rose from time to time in revolt, usually suppressed with large loss of life.

Westinghouse, George (1846-1914), American inventor and engineer, was born in Central Bridge, Schoharie co., N. Y. In 1865 Westinghouse took out patents for a device for replacing derailed cars on the track, and in 1868 invented the locomotive air brake with which his name is associated, and which he continually improved. He also patented many railway appliances for signalling and safety devices; developed the Tesla induction motor, which made possible the utilization of the alternating current for power plants; and took a foremost part in developing gas engines and in adapting the steam turbine to electric driving. He built the first ten great dynamos for Niagara, and the dynamos for the first Elevated and Subway railroads in New York and the Metropolitan Railway in London. His device for conveying natural gas through pipes for long distances made possible the extensive use of that gas for illuminating and fuel purposes in homes, mills, and factories.

West Lafayette, town, Indiana. It is the seat of Purdue University; p. 6,270.

Westminster, city, one of the metropolitan boroughs of London, is named from its great church built on what was once an island in the Thames, referred to in old records as 'Thorney'.

Westminster Abbey has a total exterior length of 531 ft.; the transepts measure 203 ft.; the nave is 38 ft. wide without the aisles, and is over 100 ft. high. Architecturally, the Abbey is one of the finest examples of Early English style, but its chief interest lies in its historical associations. Here all the kings and queens of England since William the Conqueror (except Edward v.) have been crowned, and here lie the bodies of many of Britain's greatest men. Thirteen kings are buried here, and Pitt, Fox, Warren Hastings, Gladstone, and other statesmen. In the Poets Corner, in the south transept lie Chaucer, Spenser, Dryden, Gray, Browning, and Tennyson. The Abbey also holds the body of Britain's Unknown Warrior, brought from France and interred here in French soil. The famous Jerusalem Chamber of the Abbey ascribed to the period of Henry III., was the meeting place of the revisers of the Old and New Testaments.

All that now remains of the palace begun by Canute is the beautiful Hall built by William Rufus (1097), in which Charles I. was tried, and condemned, and the crypt. The Hall was repaired in 1397 by Richard II. The Houses of Parliament, Westminster Hall, and New Palace Yard now cover the site of this old Palace. It had ceased to be used as a 'king's house,' however, in the reign of Henry VIII. (1509-47), who moved the court to White Hall, which, as York Palace, had been for 250 years the town house of the archbishops of York. White Hall was in great part destroyed by fire in 1691, and Inigo Jones prepared designs for a new palace. The Banqueting House was completed, and this was all that escaped destruction in the second fire, in 1698, which reduced the remains of old White Hall to ruins. It was out of one of the windows of the Banqueting House that Charles I. stepped on to the scaffold. It is now used as a museum of historical relics.

Two royal palaces still exist in Westminster—St. James' Palace, built by Henry VIII. in 1532, and Buckingham Palace, a comparatively modern structure. Parliament was first called to Westminster in the reign of Edward I., and there it has continued to sit till the present time. Westminster School, formerly a rival of Eton, dates from the time of Queen Elizabeth.

Westminster Abbey. See **Westminster**.

Westminster Assembly, or **Assembly of Divines**, a body of 121 clergymen and 30 laymen, all representative of England, with 4 ministers and 3 laymen delegates from Scotland, who were appointed by the Long Parliament to decide what form of doctrine and church government should be followed in England and Scotland, and who produced the doctrinal standards of British and American Presbyterianism. The Assembly sat in regular session from July 1, 1643, to Feb. 22, 1649, and continued to meet irregularly thereafter till March 25, 1652. After affirming the Solemn League and Covenant, the Assembly accepted the resolutions regarding the Directory of Worship; the Confession of Faith; the Shorter and the Larger Catechism.

Westmorland, or **Westmoreland**, northern county of England. The chief rivers are the Eden, n.e.; Lune and Kent, s. Gypsum, granite, slate, and limestone are quarried, and some lead is mined; p. 65,740.

West New York, town, New Jersey, on the Hudson River, opposite New York City. Silk and rubber goods, pearl buttons, silk braids, pianos, and cottonseed oil are manufactured; p. 37,683.

Weston, Edward (1850-1936), American electrician, was born in England, and came to the United States in 1870. He turned his attention to the improvement of electro-magnetic machines. In 1875 he founded at Newark, N. J., the first factory in America devoted to the construction of that class of machinery. Weston was founder and chairman of the board of the Weston Electrical Instrument Corporation, Newark, N. J. In 1933, he was awarded the 1932 Lamme Medal of the American Institute of Electrical Engineers.

Weston, Edward Payson (1839-1929), American pedestrian, was born in Providence, R. I. He accomplished his first feat of note by walking from Boston to Washington to attend Lincoln's inauguration (1861). In 1867 he walked from Portland, Me., to Chicago (1,237 $\frac{1}{2}$ m.) in 26 days. The aggregate of his walking feats since 1867 is said to triple the circumference of the earth. He crossed the continent in 1909 from New York to San Francisco and in 1920 from Los Angeles to New York.

West Orange, town, New Jersey. The laboratory and manufacturing works of Thomas A. Edison are situated here; p. 28,805.

Westphalia, province in West Prussia. It possesses vast deposits of coal in the basin of the Ruhr and elsewhere, and is the greatest producer of iron and iron pyrites in Prussia. Zinc, lead, copper, salt, antimony, and quick

silver are also extracted; p. 4,806,713. The province had no corporate political history previous to its creation, in 1815, out of a number of minor territories.

Westphalia, Kingdom of, a kingdom created by Napoleon and bestowed upon his brother Jerome, lasting from 1807 to 1813. It embraced a large part of Low Germany between the Elbe and the Rhine.

Westphalia, Peace of, the name given to the treaties by which the Thirty Years' War was ended. At the peace conferences every Christian nation of Europe was represented except England and Poland and the Archduchy of Muscovy. After several years of negotiations the terms of European peace were agreed upon in 1648. These provisions formed the foundation of international law until the French Revolution.

West Point, United States military post, New York, the seat of the U. S. Military Academy, is situated on the west bank of the Hudson River, 50 m. n. of New York City. The site was occupied by a military post during the Revolution, the works being constructed under the direction of the Polish patriot Kosciuszko, to whom there is a fine monument. In 1780 Benedict Arnold, who was in command of West Point, conceived the design of surrendering the place to the British. His treason was revealed by the capture of Major André at Tarrytown.

In 1790 the government acquired here a reservation of 2,100 acres. From time to time this has been added to. The U. S. Military Academy was formally opened in 1802. It occupies a plateau 180 ft. above the water, commanding a superb view up the river. See MILITARY ACADEMY, UNITED STATES.

West Springfield, town, Massachusetts. Features of interest are the town hall (1851), the park, which was the camping place of the Hessian prisoners during the Revolution, the Old White Church on Mount Orthodox, and the Day House built in 1754; p. 20,438.

West Virginia, one of the South Atlantic States of the United States. The State is irregular in shape, with a total area of 24,170 sq. m., of which 148 sq. m. are water; p. 2,005,552. Principal cities are Wheeling, Huntington, Charleston.

West Virginia is rich in mineral deposits. About 70 per cent. of the area (17,280 sq. m.) is included in the Appalachian coal fields. The coal is all of the bituminous or semi-bituminous variety, much of it of coking quality. In 1939, the state ranked second to Pennsylvania in the production of coal, with an output of 107,938 net tons; petroleum output was

3,580,000 bbls.; coke production was 1,686,070 gross tons. West Va. was originally one vast forest. It is surpassed by Arkansas alone in the production of hard wood; its timber wealth includes oak, walnut, hemlock, spruce, yellow poplar, ash and birch. The chief crops are corn, hay, potatoes, and fruits.

Manufactures.—While West Virginia is rather a mining than a manufacturing State, it is especially well adapted to industrial development by virtue of its vast deposits of coal, the abundance of petroleum and natural gas, the extensive timber areas, and the excellent water-power facilities.

In 1933, the State fundamentally reorganized its system of public schools. Institutions of higher learning include the West Virginia University; Bethany College; Morris Harvey College; West Virginia Wesleyan College; Salem College; Broadus College; and Davis and Elkins College.

The present constitution of West Virginia is that adopted in 1872, as since amended. Charleston is the State capital.

History.—The present State of West Virginia was included in the original Virginia Colony, but it was not settled until the beginning of the 18th century. Even then, because of the mountain barriers, the settlers came principally from the neighboring Pennsylvania and Maryland, rather than the eastern section, and the two divisions of the Colony had few interests in common.

The separate history of West Virginia begins with the secession of Virginia from the Union (April 17, 1861). On May 13 representatives from twenty-six counties in the west met in convention at Wheeling; repudiated the ordinance; and summoned a 'Virginia State convention,' to meet at Wheeling on June 11. This second convention declared the State offices vacant, and organized a provisional government. On July 2, the legislature of the new government met and elected U. S. Senators, who were seated by Congress. A third Wheeling convention met on November 26, when a constitution was drafted, and the name Kanawha proposed for the new State. This name was later abandoned in favor of West Virginia. In April, 1862, the constitution was ratified by popular vote, and on June 19, 1863, West Virginia was formally admitted into the Union. West Virginia has been the scene of a continuous and unsuccessful struggle over the right of miners to unionize, ever since the end of the 19th century. The strike of the miners in the Paint Creek and Cabin Creek districts in 1913 lasted for fourteen months and was one of the bitterest conflicts in American labor

history. Within recent years many Northerners have taken country homes in the mountains. See W.P.A. Writers' Project, *West Virginia* (1941).

Wetterhorn, Alpine peak of the Bernese Oberland range, rising e. of the Grindelwald valley in Switzerland. It is composed of three summits—the Mittelhorn (12,166 ft.), the Hasli Jungfrau (12,149 ft.), and the Rosenhorn (12,110 ft.).

Wexford, municipal borough and seaport, Ireland, the capital of Wexford co. Points of interest are the ruins of Selsker Abbey, founded at the close of the 12th century, the Church of St. Patrick, St. Peter's Chapel, and the old Bull Ring; p. about 12,000.

Weyden, Rogier van der (1400-64), Flemish painter. Among his best known works are *The Descent from the Cross*; *The Last Judgment*; *Madonna with Four Saints*.

Weyman, Stanley John (1855-1928), English author, wrote *A Gentleman of France* (1893); *Under the Red Robe* (1894); *Queen's Folly* (1925).

Weymouth, town, Massachusetts. Shoes are manufactured, and seam-face stone is quarried.

Whale, a large marine mammal of the order Cetacea. Whales comprise two suborders, *Whalebone whales* and *toothed whales*. The most striking characteristic of the Whalebone Whale is the presence in the mouth of plates of baleen, the substance popularly called whalebone; it is not bone, however, but a substance similar in composition to horn, and is characterized by its flexibility and its property of retaining when cold any shape that is given it when hot.

Whale Oil, as the term is used commercially, includes the oil from all whales except the sperm whale, which is of a much higher grade, and is known as sperm oil. The oil from the black-fish, porpoise, and walrus is also known as whale oil.

Whaling, the pursuit and capture of whales for commercial purposes. As an industry, it is said to have begun with the Biscayans about 1550. In the United States, shore whaling was being carried on in the early part of the 17th century in the waters off Cape Cod and Long Island; and later, Nantucket became the center of shore whaling. The industry was revived by bounties, and reached its zenith in 1846, when there were 736 ships engaged in whaling from United States ports. There are now fewer than fifty.

Wharton, Anne Hollingsworth (1845-1928). American author, was born in Southampton Furnace, Pa. She was a founder and the first historian of the National Society of

Colonial Dames of America. Her favorite subjects are those of Colonial and Revolutionary times, and she was an authority on Colonial relics, of which she was appointed a judge at the Chicago World's Fair (1893). Among her works are *Colonial Days and Dames* (1894); *A Rose of Old Quebec* (1913); *In Old Pennsylvania Towns* (1920).

Wharton, Edith Newbold (1862-1937), author, emerged into the first rank of con-



Edith Wharton.

temporary American novelists with her *House of Mirth* (1905). Her work showed the influence of Henry James and, like him, she spent much of her life in Europe. *The Age of Innocence* captured the spirit of her childhood New York. Robert Morss Lovett wrote a life of Mrs. Wharton (1925). Among her books: *Ethan Frome* (1911); *The Writing of Fiction* (1925); *Twilight Sleep* (1927); *The Children* (1928); *Hudson River Bracketed* (1929); *A Backward Glance* (1934).

Whately, Richard (1787-1863), archbishop of Dublin, was born in London. He became archbishop of Dublin (1831).

Wheat, one of the principal food crops of the world, standing second only to rice in sustaining the human family. In volume, it exceeds the rice crop by 60 per cent.; and among the grain crops of the world is surpassed only by corn (12 per cent.). Botanically the wheat plant is classified in the order Gramineae, or the grass family, which also includes corn, oats, barley, and many other common food and forage crops. Among field crops it is a cereal and an annual. Spring or summer wheat is sown in the spring, and ripens a few months later in summer. Fall or winter wheat is sown in the fall, makes its early growth before winter, and generally matures a little earlier than spring wheat. In the Northern Hemisphere it is cultivated from

about 30° to 60° north latitude and in the Southern from about 30° to 42° south latitude. In the United States, most of the winter wheat is sown in September, and most of the spring wheat in March and April. For the entire world, the time of sowing extends throughout the year. In Northern Africa wheat is sown in November and December; in Central Africa from June to September; and on some of the Mediterranean Islands from October to January.

The ideal soil for wheat is a deep, light clay or sandy loam rich in humus, to conserve the needed nitrogen element. In sowing, wheat is either drilled or broadcasted. The drill is nearly always used for sowing winter wheat, as by this method greater protection for the young crop is secured than by broadcasting.

Harvesting is carried on in Australia and South America in January, in India and the Nile region in February and March, in Mexico in April, in China in May, in Mediterranean countries in June, in Middle Europe and the greater part of the United States from July to August, in Peru and South Africa in November, and in Burma in December. In the United States it begins in May in Texas, and ends in August in Washington and North Dakota. In most countries the harvesting is done with machines, comprising the self-rake reaper, the binder, the header, and the combined harvester and thrasher. After the crop is bound into sheaves it is put up into shocks, to protect the heads against the weather. In the shock the straw and grain are allowed to dry for a few days, and then the sheaves are either hauled together and stacked, or are hauled directly to the thrashing machines. The main use of wheat is the manufacture of flour for bread and pastry. The flour from durum wheat is used for pastes such as macaroni and spaghetti. The milling by-products in flour-making—the bran, shorts, and middlings—are used for feed.

The principal diseases attacking wheat are rust, stinking smut or bunt, and black or loose smut. There is no known remedy for rust. The most common insect enemies are the chinch-bug and the Hessian fly. Preventive measures, such as keeping the fields free from rubbish to prevent the hibernation of insects, sowing late, rotating crops, and burning the stubble, are employed; but there is no remedy when these insects infest the fields.

In 1938 the world's production of wheat, not including the U. S. S. R., China, Iran, and Turkey, was 4,349,000,000 bushels.

The production of wheat for various countries in 1938 was as follows:

COUNTRY	BU.
United States	940,229,000
India	402,453,000
France	335,100,000
Italy	297,317,000
Canada	348,100,000
Argentina	285,000,000
Australia	130,000,000
Germany	214,723,000
Spain	102,900,000
Rumania	181,768,000

In 1953, the U. S. produced 1,202,829,000 bushels of wheat.

Wheaton College, an institution for the higher education of women in Norton, Mass. It was founded in 1834 as Norton Female Seminary and opened the following year. In 1839 the name was changed to Wheaton Female Seminary, in honor of its founder Judge Wheaton, and in 1912 the name was again changed to Wheaton College, when distinctive college work was inaugurated.

Wheatstone, Sir Charles (1802-75), English physicist, was born near Gloucester. His first researches were in connection with sound. In 1834 he became professor of experimental Philosophy at King's College, London, and in 1837 took out patents for an instrument for giving signals by electricity, which has grown into the telegraph. In 1838 he invented the stereoscope, and in 1843 instruments for measuring the constants of a voltaic series. Wheatstone's bridge for measuring electrical resistance was not his invention but it was he who brought it into public notice.

Wheel, Breaking on the, a method of inflicting the death penalty with torture, introduced in 1534 in France. The criminal was bound to a wheel, or similar framework, and the bones of the arms and legs broken by blows with an iron bar. This penalty was abolished in France in 1789, in Prussia in 1811, and in England in 1604.

Wheel and Axle, a machine consisting of a wheel secured to a coaxial shaft. When this simple machine is used for raising heavy weights, the string supporting the load is wrapped round the axle, while that by which the power is applied is coiled round the wheel. If the wheel be replaced by a handle, the machine becomes a windlass; the addition of a jib and stay and a little extra gearing make it into a crane.

Wheel Base, the distance between centres, from extreme front to extreme back wheel, of locomotive or car.

Wheeler, Joseph (1836-1906), American soldier, was born in Augusta, Ga., September 10, 1836. Upon the secession of Georgia he was appointed first-lieutenant of artillery of the Confederate Army, and September, 1861, was promoted colonel of the Nineteenth Alabama infantry regiment. After brilliant services at Shiloh and during the retreat from Corinth to Tupelo, Miss., he was placed in command of all the cavalry of the Army of Mississippi. Later in command of the cavalry of the Army of Tennessee he covered Bragg's retreat to Chattanooga, and was commissioned major-general in January, 1863. Among his subsequent services may be mentioned his skilful command of the cavalry at Chickamauga and around Chattanooga; the advance to Knoxville, capturing nearly 1,000 prisoners; and the skilful resistance offered to Sherman's advance through Georgia and South Carolina. After the war, having removed to Alabama, he was elected (1880) to Congress; he resigned this position in 1899, having been appointed Major-General of Volunteers in the U. S. Army in May, 1898. He commanded in the battle at Las Guasimas and led the center of the army at the battle of San Juan Hill, July 1, 1898. He afterwards served in the Philippines, and was later placed on the retired list with the rank of brigadier-general in the regular army of the United States.

Wheeler, Schuyler Skaats (1860-1923), engineer, was born in New York City. He developed the electric motor and invented the electric fan.

Wheeler, Wayne Bidwell (1869-1927), temperance advocate, was born in Brookfield, Ohio. As an attorney and legislative superintendent of the Anti-Saloon League he successfully prosecuted over 2,000 saloon cases.

Wheeling, city, West Virginia, county seat of Ohio co. the largest and most important city of the State. A suspension bridge, with a span of 1,010 ft., and two steel railroad bridges cross the Ohio here. The iron, steel, and tin manufacture of the State is largely centered in Wheeling, and is the first of the city's industries, with coal mining second. The manufacture of glass and pottery is next in importance. Wheeling is also famous for its tobacco products; p. 58,891.

Wheelock, Eleazar (1711-79), American educator, was born in Windham, Conn. He became pastor of the Second Congregational Church at Lebanon, Conn., where he remained until 1770, gaining great reputation as a preacher. He taught to increase his income, and in 1743 received his first Indian pupil, Samson Occom, a Mohican Indian. The num-

ber of Indians (whose expenses were met by contributions) increased, and in 1766 £10,000 was raised in England and placed in the hands of William Legge, Earl of Dartmouth, and other trustees; and land received at Dresden (now Hanover), N. H., was set off as the site of a classical seminary and Indian school to be named after Lord Dartmouth (see DARTMOUTH COLLEGE).

Whelk, a name applied to a number of marine carnivorous gastropods, but properly restricted to the species of *Buccinum* and *Fusus*. Allied to *Buccinum* is the genus *Fusus*, including the forms called spindle-shells, red whelks, or roaring buckies, which have markedly fusiform shells. The dog-whelk is the common *Purpura lapillus*, abundant everywhere on both coasts of the North Atlantic between tidemarks.

Whig, the designation of a party in English politics, was, like many political names, first applied in derision. It is a shortened form of 'Whigamore,' a term applied to the Covenanting men of the southwest of Scotland (variously derived from *whig*, sour whey, and *whiggam*, a sound made by drivers to urge on their horses). The word seems to have been generally applied after the Restoration to the whole Presbyterian party in Scotland, and later in England to all who were suspected of opposition to the king, or of sympathy with the nonconformists.

Whig Party, a political party in the United States growing out of the National Republican Party. The members favored, among other reforms, 'adequate protection to American industry,' and were strongly opposed to Jackson. They assumed to stand for a true 'republican and patriot' position of opposition to the increase of the power of the executive at the expense of the legislature. The early Whig party was made up of several diverse, if not actually conflicting elements, such as the National Republicans, the Nullifiers or extreme States' rights men, the Anti-Masons, former Jackson men who were opposed to his high-handed policy, and personal opponents of Jackson. It was never a party of fixed principles or harmonious purpose, and as the question of slavery became increasingly prominent, differences within its ranks increased. A final effort to hold the party together was made in 1852, when a platform was adopted containing a resolution to acquiesce in the Fugitive Slave Law as a settlement of the Slavery question. The Whig candidate, General Scott, was defeated, and by 1856 the Whig organization was dissolved.

Whippet, a dog developed from the grey-

hound, and much used in racing. It is trained by having the owner, stationed at the end of the course, wave a towel, which excites the dog to race at high speed.

Whipping. A punishment formerly quite common for minor offences. In the United States, it was at one time prescribed as a form of punishment in a number of States, but has been long since abolished in most of them. In Delaware those convicted of wife-beating may still be punished in this way.

Whipple, Squire (1804-88), American civil engineer, was born in Hardwick, Mass. In 1840 he patented a machine for gauging the tare of canal boats, and a new form of iron truss for railroad bridges known as the 'Whipple trapezoidal truss.' In 1872 he invented a lift draw-bridge for canals and other narrow waterways.

Whipple, William (1730-85), American politician, signer of the Declaration of Independence, was born in Kittery, Me. He was a member of the provincial Congress of 1775, member of the Continental Congress in 1776-79, and judge of the Superior Court in 1782-85.

Whip-poor-will (*Anthus vociferus*), a North American night-jar, receiving its name from its cry, which is loud and clear, and heard only at night.

Whirlwind, a mass of air whose elevation is very much greater than its width, and which rotates rapidly round a more or less vertical axis. It is a purely local phenomenon, and does not last long.

Whiskey, a liquor obtained by distillation of a mash of fermented grain. In this country corn and rye are used and also mixtures of these with other grains, such as barley or wheat. In Great Britain barley is the grain usually employed. According to the U. S. Pharmacopœia, the alcoholic liquor as it comes from the still must be stored in wood for at least four years before it becomes whiskey, during which storage marked changes in the flavor, odor, and taste take place. These changes are due to a slow oxidation of the alcohols and other volatile bodies present and the formation of fragrant ethers. Many attempts have been made to discover some process of quick aging of whiskey, but so far without success. In whiskey making it is not the yield that is so much desired as the flavor of the product that is sought. In this respect it differs from the making of alcohol where quantity and freedom from flavor is the object in view. The peculiar smoky flavor of Scotch whiskey is due to the method of preparing the malt by drying in kilns over peat fires. 'Bottled in bond' whiskey is whiskey which is bottled in a bonded warehouse under the super-

vision of the government officer in charge, and the stamp over the cork gives a government guarantee that the whiskey is 100 proof and of a certain age, and that there has been no addition or adulteration. The greater part of the whiskey on the market is blended, or a mixture of neutral spirits and a small amount of whiskey, or neutral spirits which have been colored and flavored with artificial essences, but under the Foods and Drugs Act of 1906 these mixtures and compounds have to be so labelled that the purchaser may be able to know what he is buying. Bourbon whiskey is the name given to corn whiskey, deriving its name from a county of Kentucky where it was largely made. 'Moonshine' whiskey is that made in illicit distilleries. There are a great number of these in the mountains of the South, the mash used being generally corn and the still of the simplest type.

Whiskey Insurrection or Rebellion, an uprising in western Pennsylvania, culminating in 1794, growing out of the imposition of an excise tax by the Federal government. The state protested against the passage of the Federal law in 1791, and a meeting of its opponents was held at Brownsville (Red Stone Fort) July 27, 1791. Albert Gallatin was secretary of the meeting, and a convention was called for the first Tuesday in September. On that date delegates from the four western counties met at Pittsburg and passed violent resolutions. President Washington issued a proclamation, Sept. 5, ordering the rioters to yield obedience to the law. The result was unsatisfactory, and Sept. 25 Washington ordered out 15,000 militia from Pa., N. J., Md., and Va. under command of Gov. Henry Lee of Va. On the approach of the troops the leaders fled the country, and at a general meeting at Parkinson's Ferry, Oct. 24, a general submission was made.

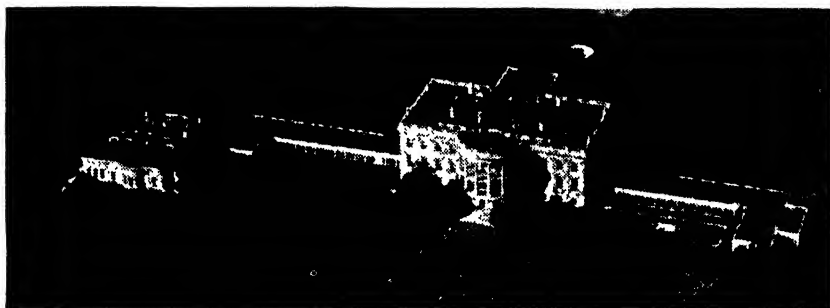
Whiskey Ring. The name given to an association of distillers, rectifiers, and internal revenue officers, which during the presidency of Grant defrauded the United States Government of several millions of dollars. Early in 1875, however, Bristow, the secretary of the Treasury, and Bluford Wilson, the solicitor, collected evidence against the lawbreakers. On May 10, 1875, sixteen distilleries and an equal number of rectifying houses in St. Louis, Chicago, and Milwaukee were seized by government officers. Indictments were ultimately secured against more than 200 persons, among them being John A. Joyce, special revenue agent, John McDonald, a supervisor, William O. Avery, chief clerk of the Treasury Department, and Col. Orville E. Babcock, President

Grant's private secretary. Every effort was made by the political allies of the ring to poison the mind of President Grant against Secretary Bristow and secure a miscarriage of justice. Babcock was tried in February, 1876, but escaped through lack of evidence. Most of the other defendants were convicted, but some were *non-prossed*. Of those sentenced most were pardoned before the expiration of their terms. In the spring of 1876 Bristow began proceedings against the ring in California, but Republican politicians brought such pressure to bear upon the President that Bristow, finding himself unsupported, resigned. The whole matter reflected great discredit upon the administration.

Whist, a four-handed card game, two partners contending, the name being probably de-

his friend, and fellow senator, Ezra Cornell, in securing the necessary legislation for the establishment of Cornell University. As first president of Cornell (1867-85), he was successful, in spite of many difficulties, in the upbuilding of that institution. He was United States minister to Germany (1879-81) and to Russia (1892-4); was a member (1896-7) of the Venezuelan Commission appointed by President Cleveland; and was president of the American delegation at the first International Peace Conference at The Hague (1899).

White, Edward Douglass (1845-1921), American jurist, and Chief Justice of the U. S. Supreme Court, was born in La Fourche Parish, La. He was admitted to the bar in 1868; was a State senator (1874-8), Justice of the Louisiana Supreme Court (1878-91), and



The White House, Washington, D. C.

rived from an old game called whisk and swabbers. For Bridge Whist, see BRIDGE.

Whistler, James Abbot McNeill (1834-1903), American impressionist painter, etcher, and lithographer, was born in Lowell, Mass., a son of Major George W. Whistler, of the U. S. Army. After three years at West Point, he entered the studio of Gleyre in Paris, where he studied for two years. He settled in Chelsea in 1895. His painting *The White Girl* attracted much attention at the famous *Salon des Refusés*. One of the best of his pictures in oil, *The Artist's Mother*, an 'arrangement in black and gray,' was awarded a gold medal in the Salon of 1884, and is now the property of the Louvre, Paris. It was exhibited in America at the Chicago Century of Progress Exposition. As an etcher and dry-pointer Whistler was even more widely recognized than as a worker in color.

White, Andrew Dickson (1832-1918), American educator and diplomat, was born in Homer, N. Y. From 1863 to 1867 he was a member of the New York Senate, and while serving in this capacity was associated with

United States Senator (1891-4). In 1910 he was made Chief Justice by President Taft. Among his important decisions were those in regard to the Standard Oil and American Tobacco Companies.

White, Gilbert (1720-93), English naturalist, was born in Selborne. He became a fellow of Oriel College, Oxford, in 1752. He settled at Selborne (Hampshire) in 1751, where he spent the remainder of his life, occupied in the observation of nature, the result being the famous *Natural History of Selborne*, projected in 1771 and finished in 1789.

White, Horace (1834-1916), American journalist and writer on finance, born in Colebrook, N. H., and graduated at Beloit College in 1853. In 1856 he joined the staff of the Chicago *Tribune*, and in 1858 he accompanied Lincoln during his campaign against Douglas. From 1865 to 1874 he was editor and part owner of the *Tribune*. In 1877 he moved to New York, and four years later became associated with Carl Schurz and Edwin L. Godkin upon the New York *Evening Post*, devoting especial attention to finance. In 1899 he suc-

ceeded Godkin as editor-in-chief, and retired in 1903. He became known as an authority on banking and economics, and on American history during the period of the Civil War.

White, Hugh Lawson (1773-1840), American politician, was born in Iredell co., N. C. He was for a short time private secretary to Governor Blount, and was a State senator, judge of the Tennessee Supreme Court (1809-15), president of the Bank of Tennessee (1812-17), and U. S. Senator (1825-40). He opposed the expunging resolution, and in 1836 became an independent candidate for the Presidency against Van Buren. He received only 26 electoral votes.

White, James William (1850-1916), American surgeon and educator, was born in Philadelphia. He was on the staff of Professor Agassiz during the Hassler expedition (1871-2). Besides numerous articles in medical journals, he collaborated in *American Text-Book of Surgery*; *Genito-Urinary Surgery*; *Human Anatomy*.

White, Peregrine (1620-1704), the first child born of English parents in New England. He was born on the *Mayflower*, which at the time was in Cape Cod Harbor, on Nov. 20, 1620.

White, Stanford (1853-1906), American architect. From 1878 to 1880 he travelled and studied in Europe, and meanwhile formed a connection with Charles F. McKim and William R. Mead, taking up active work as an architect with them in 1881. Among architectural works with which he was particularly associated are the New York University buildings, Washington Arch, Century and Metropolitan Club buildings, all in New York City, and the University of Virginia buildings. He was shot and instantly killed on June 25, 1906, by Harry K. Thaw.

White, Stewart Edward (1873-1946), Am. author, was born in Grand Rapids, Mich. He was graduated (1895) at the University of Michigan. He turned his attention to fiction, and his stories and novels of Western life were immediately successful. His books include *The Claim-Jumpers*; *The Forty-Niners*; *Daniel Boone*; *Ranchero*; *The Road I Know* (1942).

White, William Allen (1868-1944), Am. journalist and author, was born in Emporia, Kans. After various newspaper experiences, he bought the *Emporia Gazette* in 1895, of which he became editor and proprietor. During the World War the Red Cross sent him to Russia where he observed conditions and was later a delegate at Prinkipo, 1918. His writings picture Midwestern small-town life. His

books include *Life of Woodrow Wilson*; *Life of Calvin Coolidge*; *Autobiography*.

Whitefield, George (1714-70), English evangelist, one of the early leaders of Methodism, was born in Gloucester. He paid several visits to America, the last in 1769-70. Early in 1741 a breach occurred between Wesley and Whitefield, the latter holding the Calvinistic doctrine of predestination, and Wesley the Arminian view. A personal reconciliation took place shortly afterward, but the followers of Whitefield built for him the Tabernacle in Moorfields, London.

Whitefish, a general name for the fishes of the genus *Coregonus* of the salmon family, that dwell in the rivers and lakes of North America, and are especially abundant and important as food fishes in the Great Lakes region.

White Flag. Except when obviously intended as a flag of truce the raising of a white flag in warfare is universally accepted as a token of surrender.

Whitehall, a former royal palace, in London, England. It was a residence of royalty from 1530 to 1697, when it was destroyed by fire. In front of Whitehall, Charles I. was beheaded in 1649.

Whitehead, Alfred North (1861-1947), British philosopher and mathematician, professor at Harvard 1924-36, has published works on philosophy of physical science and inquiries into foundations of mathematics and logic. Among these are *Process and Reality*; *Adventures of Ideas*; *Science and the Modern World*. He received the Butler Medal of Columbia, 1930.

White House, the official residence of the President of the United States, in Washington, D. C., formerly called the Executive Mansion. It was designed by James Hoban, and the cornerstone was laid by Washington on Oct. 13, 1792. The building is of freestone, painted white. The White House was first occupied by President Adams in 1800. It was burned by the British in 1814, but was restored and re-occupied in 1818. Extensive alterations and additions were made in 1902-3, under the direction of Charles F. McKim. The grounds that surround the building are attractively laid out, and in them are held garden parties. Here also is held the Easter egg rolling, participated in by children. See WASHINGTON, D. C.

White Lady, in legend. The legendary White Lady of Scott's *Monastery* and of Scribe's *Dame Blanche* is derived from the Teutonic tradition, which speaks of a supernatural white woman attached to a royal or noble family. In France, whenever a king of

the house of Bourbon was about to die, a tall woman, clad in white, was seen to walk along the galleries of the castle at midnight. The white woman appears also to peasants, to whom she gives some article which becomes transmuted into gold or silver.

White Lead is a basic carbonate of lead, $\text{Pb}(\text{OH})_2\text{PbCO}_3$, much used as a pigment. It has much greater 'covering' power than any other white pigment, but is poisonous. In commerce the term white lead is applied also to compounds in which the lead may be replaced by zinc.

White Mountains, a group of mountains in Central New Hampshire, belonging to the crystalline belt of the Appalachian system, and containing the highest elevations in New England. The mountains extend from Squam Lake, in the s., to the Androscoggin and Upper Ammonoosuc Valley, in the n. They are made up chiefly of ancient metamorphic rocks—granites, gneisses, and schists predominating.

The White Mountains are divided by the Crawford Notch into the Presidential Range on the e., and the Franconia Mountains on the w. The eastern portion contains the highest peaks of the group, including Mount Washington, 6,293 ft.; Mount Adams, 5,805 ft.; Mount Jefferson, 5,725 ft.; Mount Clay, 5,554 ft.; Boot Spur, 5,520 ft.; Mount Monroe, 5,390 ft.; and Mount Madison, 5,380 ft. The highest peak of the Franconia Mountains is Mount Lafayette, 5,269 ft.

White Plains, city, New York. It is an attractive residential suburb, and contains many fine estates. Here occurred the Battle of White Plains in the American Revolution; p. 49,327. The White Plains Hospital, Burke Foundation, and Bloomingdale Asylum are famous institutions here.

White Plains, Battle of, in the American Revolution, was fought on Oct. 28, 1776, near White Plains, N. Y., between a part of Washington's army and a part of the British army under Howe. On Oct. 28 Howe directed General Leslie to attack Chatterton Hill, an American outpost. General McDougall arrived with additional American troops, and the attack was resisted with much bravery. The militia finally gave way, but the American forces crossed the Bronx to the rear of Washington's line in good order. The British loss was 230, and the American loss about 130. Howe made no further attack, and during the night of Oct. 31 Washington retired to a strong position at North Castle.

White Russia or Byelorussian S. S. R., one of the sixteen republics of the U. S. S. R. Area, 49,022 sq. m.; population, 5,246,400.

The term 'White Russian' is also applied to members of the older republic, under Krensky, or any opposed to the 'Reds,' especially those exiled in Paris and elsewhere.

White Sea, a large gulf of the Arctic Ocean, penetrating Archangel government, Northern Russia, as far as 64° n. lat. The Dvina, Onega, and Mezen Rivers enter the White Sea. It is frozen from October to May. The fisheries are of considerable importance. Archangel is the chief port.

White Slavery, a term popularly applied to the system whereby women and girls are lured or forced into prostitution for the profit of the procurers who induce them to enter houses of vice, the importers or exporters who transport them, and the resort keepers who live on their immoral earnings. The concerted movement against white slavery began with the framing, in 1902, of an international treaty providing for the establishment by each of the contracting governments of an authority to centralize information concerning the procurement of women and girls for exportation; for government supervision of railway stations, ports of embarkation, and transportation lines; and for the return of rescued women and girls to the country of their origin. The treaty was ratified by the United States, France, Great Britain, Germany, Belgium, Denmark, Spain, Italy, Netherlands, Portugal, Russia, Sweden, Norway, and Switzerland.

White Sulphur Springs, watering place, Greenbrier co., West Virginia. It is one of the most popular summer resorts in the Southern States, lies amid fine mountain scenery, and contains several large hotels.

Whitethroat (*Sylvia cinerea*), a bird of the family Sylviidae, common during summer in Europe. The American Whitethroat is the white-throated sparrow.

Whiting. See **Chalk**.

Whiting (*Gadus merlangus*), a species of fish of the family Gadidae, with pellucid silvery color on the sides. It is found along European coasts, and is considered a fine fish for table.

Whitlock, Brand (1869-1934), American author and diplomat, was born in Urbana, Ohio. After serving as a newspaper reporter and correspondent in Toledo (1887-90) and on the *Chicago Herald* (1890-3), he was admitted to the bar, and in 1897 began the practice of law in Toledo. In 1905 he was elected mayor of Toledo as an independent non-partisan candidate, and re-elected in 1907, 1909, and 1911. In 1913 he was appointed by President Wilson U. S. Minister to Belgium, where he made a distinguished record, and was active in relief work during World War I.

Whitman, Charles Seymour (1868-1947), American lawyer and public official, was born in Norwich, Conn. He was assistant corporation counsel of New York City (1901-03); member and president of the Board of City Magistrates (1904-07); and judge of the Court of General Sessions (1907-10). From 1910 to 1914 he was district attorney of New York co., and was active in the prosecution of corrupt public officials, one of his most notable cases being the conviction of Police Lieutenant Charles Becker for the murder in July, 1912, of Herman Rosenthal. In 1914 Whitman was elected governor of New York State, for the term ending Dec. 31, 1916.

Whitman, Walt (1819-92), American poet, was born in West Hills, Long Island, N. Y. He left school at twelve, learned typesetting in a Brooklyn newspaper office, and taught country schools in Long Island. In 1839 he established at Huntington, and published for about a year, a newspaper, *The Long Islander*; and was thereafter variously occupied as editor and writer until 1846, when he became editor of the *Brooklyn Eagle*. In 1855 he became known to the American public as Walt Whitman the poet, for in that year he published his famous



Walt Whitman.

Leaves of Grass, a perturbing and revolutionary collection of unrhymed and irregular verse. From December, 1862, to July, 1865, Whitman saw much of the sad and pitiable side of the Civil War, serving as a nurse in the Washington hospitals, of which he has left a record in *Drum Taps*. In February, 1865, he had obtained a clerkship in the Department of the Interior, from which he was dismissed in the same year by a new secretary who objected to the 'Adamic' passages in *Leaves of Grass*. Another place was found, however, under Attorney-General Speed, which Whitman held until an attack of paralysis incapacitated him

in 1873. In 1871 appeared *Democratic Vistas*, a plea in prose for a characteristic American democratic literature, and a reply to the many strictures upon his poetry.

Broken down in health, Whitman in 1873 went to live with his brother, Col. George Whitman, at Camden, N. J., where he remained for ten years. He purchased the little house in Mickle Street, Camden, N. J., in which he lived until his death, on March 26, 1892. He had previously issued *November Boughs* (1888); *Good-bye, my Fancy* (1891); *Complete Poems and Prose* (1888); and a final edition of *Leaves of Grass* (1892). Minor publications include *Passage to India* (1871), *As a Strong Bird on Pinions Free* (1872), and *Calamus: Letters Written during the Years 1868-1880 to a Young Friend*.

Whitney, Eli (1765-1825), American inventor, was born in Westboro, Mass., and worked his way through Yale, graduating in 1792. Going to Georgia as a teacher, he found a generous patron in Gen. Nathanael Greene's widow, on whose estate he resided, and studied law. The cotton industry was then trivial, the best species having seed to be slowly picked from the fibre; and Whitney was asked to invent a quicker way. Drawing his own wire and making his own tools, he invented the *Cotton Gin* (see article Corron) which increased the day's product two hundredfold, made the South rich, and roused a storm of unprincipled greed in its beneficiaries. Congress refused renewal of the patent. In despair Whitney relinquished a partnership to manufacture the gin in New Haven, and turned to inventions in firearms, being the first to make interchangeable parts. Government contracts beginning in 1798 enabled him to found a successful business at Whitneyville.

Whitney, Josiah Dwight (1819-96), American geologist, was appointed the first State geologist of California, and from 1860 to 1874 conducted an extensive geological and topographical survey of that State and of the Rocky Mountains. In recognition of these services Mount Whitney was named for him.

Whitney, Mount, the highest mountain of the United States outside of Alaska, is situated in the Sierra Nevada Range, in Southern California. Height, 14,898 ft.

Whitney, William Collins (1841-1904), American financier and public official, took a prominent part in the movement against the Tweed Ring, and was corporation counsel of New York City in 1875-82. He served as Secretary of the Navy in President Cleveland's first administration (1885-9), and was an important factor in the up-building of the United

States Navy which began at that time. It was largely due to Whitney's masterful political management that Cleveland was again nominated in 1892.

Whittier, John Greenleaf (1807-92), American poet and reformer, was born in Haverhill, Mass., of Quaker parentage. He taught school, meanwhile writing both prose



John Greenleaf Whittier.

and verse for newspapers. He edited *The American Manufacturer*, the *Haverhill Gazette*, and the *New England Weekly Review*. Having become actively interested, through Garrison, in the anti-slavery movement, he published his pamphlet *Justice and Democracy* in 1833, and in December of the same year assisted as a delegate at the founding of the American Anti-Slavery Society in Philadelphia. In 1832 had appeared the first (pamphlet) collection of his writings, *Legends of New England in Prose and Verse*, containing prose sketches not afterward included in his works. *Moll Pitcher*, a Poem, appeared in 1832, and the same year he edited *The Literary Remains of John G. C. Brainard*.

From 1840 to 1850 Whittier wrote some of his most powerful anti-slavery poems, such as 'Ichabod' and 'Massachusetts to Virginia.' Later volumes included *Home Ballads and Poems* (1860), *In War Time, and Other Poems* (1864), *National Lyrics* (1865), *Snow-Bound: A Winter Idyl* (1866), *Ballads of New England* (1870), and *At Sundown* (1892). His *Writings*, edited by himself in 7 volumes, were issued in 1888-9, and the *Complete Poetical Works* posthumously in 1895.

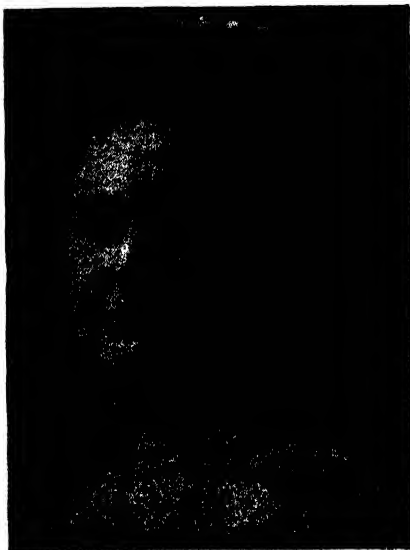
Whittington, Richard ('Dick') (1358-1423), English merchant, was the son of a Gloucestershire knight. Of his early life we know nothing, but in 1380 he was a substantial city mercer, and records exist of his having

loaned large sums of money to Richard II., Henry IV., and Henry V. He was lord mayor in 1397, and again in 1406 and 1419. He is the hero of the traditional romance of Dick Whittington and his Cat.

Whooping-cough, or **Pertussis**, a highly contagious epidemic disease. The disease is characterized by violent fits of coughing generally accompanied by a peculiar loud whoop or crowing inspiration. The period of incubation lasts about ten days, after which the usual signs of ordinary cold set in.

Wichita, city, Kansas, county seat of Sedgwick co. It is situated in a rich farming district and is an important shipping point for live stock and grain. The packing industry is of great importance, and the city is one of the largest flour milling centers in the country. The industries include: broom, airplane, stove, lamp and mentholatum factories; flour mills, oil refineries and wells, grain storage facilities. The city is an important education center: University of Wichita, Friends University, American Indian Institute, Mt. Carlel Academy, St. John's Academy; p. 168,279.

Wichita Falls, city, Texas, county seat of Wichita co., is surrounded by oil fields and is a supply center for the North Texas oil fields; p. 68,042.



Wilhelmina, Queen-Mother of Holland.

Wickersham, George Woodward (1858-1936), American lawyer and public official, born Pittsburgh, Pa. Was attorney-general in Pres. Taft's cabinet, after which he re-

tired. See **Wickersham Commission**.

Wickersham Commission, the *National Commission on Law Observance and Law Enforcement*, appointed by President Hoover in 1929, and consisting of George W. Wickersham, chairman; former Secretary of War Newton D. Baker; Federal Judges William S. Kenyon, Paul J. McCormick and William I. Grubb; former Chief Justice Kenneth Mackintosh of the Supreme Court of Washington; Dean Roscoe Pound of Harvard Law School; President Ada L. Comstock of Radcliffe College; Henry W. Anderson of Virginia; Monte M. Lemann of New Orleans, and Frank J. Loesch of Chicago.

Widdemer, Margaret (1880-), American author. Her verse, *Old Road to Paradise* (1919) won the Pulitzer Prize. Her novels include *The Rose Garden Husband* (1915); *Constance Herself* (1945).

Widener, Harry Elkins (1885-1912), book collector, lost his life in the Titanic disaster. He owned the greatest Stevenson collection in the world. His library, willed to Harvard, is in the Widener Library.

Wiesbaden, city, Prussia, is beautifully situated among orchards and vineyards at the base of Mt. Taunus. For centuries it has been celebrated as a watering-place.

Wig (contraction of 'periwig,' 'peruque'), an artificial headdress of hair, used in case of baldness, on the stage, by judges and barristers in Great Britain, and formerly, for fashion, by all classes. Wig-wearing was rendered fashionable in France by Louis XIII., though in the 14th century false tresses (*coifs à templettes*) had been worn by ladies. Louis XIV. (1673) raised the wig to its highest degree of size and fashion. Towards the end of the 18th century the wig began to give place to the powdered queue. Benjamin Franklin stood wigless before Louis XVI. The French Revolution abolished wigs.

Wiggin, Kate Douglas (1856-1923), American author, was born at Philadelphia. Her books include *The Birds' Christmas Carol*; *Rebecca of Sunnybrook Farm*; *Mother Carey's Chickens*.

Wight, Isle of, an island in the English Channel included in Hampshire, England, separated from the mainland by the Solent and the Spithead. The surface is hilly and the soil generally poor.

Wilberforce, William (1759-1833), English philanthropist. Through his efforts the importation of African slaves into England and the British colonies was prohibited (1807).

Wilbur, Curtis Dwight (1867-1954), American public official, was born at Boonesboro, Iowa; chief justice California Supreme Court (1922-24); Secretary of the Navy (1924-29); Federal Judge (1929-45).

Wilbur, Ray Lyman (1875-1949), American educator and public official, was born at Boonesboro, Iowa; educated at Stanford University; professor of medicine at Stanford (1909-16); dean of medical school (1911-16); president of Stanford (1916-42); Secretary of the Interior (1929-33).

Wilcox, Ella Wheeler (1855-1919), American poet, was born at Johnstown Center, Wisconsin. She wrote *Poems of Passion* (1883); *Poems of Pleasure* (1888); *Beautiful Land of Nod* (1892).

Wilde, Oscar Fingall O'Flahertie Wills (1856-1900), Irish author and dramatist, was born in Dublin. He was educated at Trinity College, Dublin, and Oxford. His prose work, *The Picture of Dorian Gray*, appeared in 1891. In 1892 Wilde won his first dramatic success with *Lady Windermere's Fan* (published in 1894), followed by *The Importance of Being Earnest*. His play *Salome* (1893), written in French, was produced in Paris (1894) by Sarah Bernhardt. In 1895 he was convicted of serious offences against morality and was sentenced to prison for two years. During this period he wrote the *Ballad of Reading Gaol* and *De Profundis*.

Wilder, Thornton (1897-), American author, was born at Madison, Wisconsin; educated at Yale; taught at University of Chicago (1930-36). He wrote *The Bridge of San Luis Rey* (1927), receiving the Pulitzer Prize; *Heaven's My Destination* (1934); and the plays *Our Town* (1938), *The Skin of Our Teeth* (1942).

Wiley, Harvey Washington (1844-1930), chemist, was born in Kent, Indiana. He was State chemist of Indiana, professor of Chemistry at Purdue U., and from 1883-1912 was chief of the Bureau of Chemistry in the U. S. Dept. of Agriculture. The passage of the Pure Food and Drugs Act in 1906 was due to his efforts.

Wilfrid, Saint (634-709), bishop of York, became (658) leader of the pro-Roman party, and won over the king of Northumbria to their side.

Wilgus, William John (1865-1949), Am. civil engineer, was born in Buffalo, N.Y., and was educated in the public schools of his native city. From 1893 to 1907 he held various positions with the New York Central & Hudson River Railroad, ranging from assistant

engineer to chief engineer and vice-president, in charge of expansion of the system, including Grand Central Terminal and electrification of the suburban zone at New York. During the World War he was director of military railways, A. E. F. He was consulting engineer of the N. Y. Transit Commission, 1923-24.

Wilhelmina (1880-), Queen-Mother of Holland, b. at The Hague, daughter of William III. and Emma, a princess of Waldeck-Pyrmont. Wilhelmina succeeded to the throne in 1890, with her mother as queen-regent, and on attaining her eighteenth year became queen. She proved a popular and able ruler. In 1901 she married Henry, Duke of Mecklenburg-Schwerin. He died in 1934. An heiress to the throne, Juliana Louisa Emma Maria Wilhelmina, was born in 1909. After Holland's invasion by the Germans in 1941, the queen and her cabinet functioned in England. Queen Wilhelmina visited the United States in 1942 and 1943; abdicated 1948.

Wilkes, Charles (1798-1877), American naval officer and explorer, was born in New York City. He is best known as the commander of a notable exploring expedition, popularly called the 'Wilkes Expedition,' in 1838-42. During this time he visited the Antarctic regions, various islands and groups of islands in the Pacific and the Pacific coast of what is now the United States. On outbreak of the Civil War he was placed in command of the U. S. sloop-of-war *San Jacinto*, and on Nov. 8, 1861, between Havana and St. Thomas in the West Indies, stopped the British mail-steamer *Trent*. He became a commodore in 1862.

Wilkes-Barre, city, Pennsylvania, is picturesquely situated in the Wyoming Valley. Wilkes-Barre is the chief anthracite centre of the State, and manufactures locomotives, lace, and silk. The city was settled in 1769; p. 76,826.

Wilkins, Sir George Hubert (1888-), Australian aviator, was born in Mount Bryan, South Australia. He went with the Stefansson Canadian Arctic Expedition in 1913-17, and in May, 1917, obtained a commission in the Australian Flying Corps, becoming official photographer with the Australian Imperial Forces in France, and being twice mentioned in despatches and receiving the Military Cross. In 1928 in company with Lieut. Carl B. Eielson he flew from Point Barrow, Alaska, to Green Harbor, Spitzbergen, a distance of 2,200 m. in twenty hours and twenty minutes, an undertaking generally regarded as one of the greatest flights in the history of aviation and as of the utmost scientific value, as establishing the fact of the non-existence of land between

Alaska and the Pole. Since then he has commanded various exploring expeditions.

Wilkinson, Sir John Gardner (1797-1875), English explorer and Egyptologist, was born in Westmoreland. He went to Egypt in 1821 and spent twelve years (1821-33) in Upper Egypt and Nubia, travelling and making discoveries of buried tombs. He made four subsequent journeys to Egypt in 1841, 1843, 1848, 1855; and in 1844 he travelled also through Montenegro and Bosnia.

Will, in psychology a general term for those mental states in which the individual asserts itself or resolves to act in a certain way. Some psychologists, however, restrict the term to those cases in which a choice or decision is made between two or more alternative acts.

Will, in law, a document by which a person disposes of his property, to take effect at his death. Any adult person of sound mind may make a valid will. The test of mental competency is usually whether the testator understands the nature of the act, the fact that he is disposing of his property, and the reasons for selecting the beneficiaries named. If, although mentally competent, a testator is unduly influenced by another against a person, as a wife or child, who is a natural subject of his bounty, his will may be set aside by that person. The statutes of different states vary as to formal matters of execution, but common provisions are that a will must be signed at the end thereof by the testator, either in the presence of two or more witnesses, or he must acknowledge to them separately or together that he signed it, and he must declare in the presence of each that the document is his last will and must request them to sign as witnesses thereto. In most states, a legacy to a witness is void. A will in the handwriting of the testator is sometimes called a holograph.

Willamette, a river of Oregon, rising in the Cascade Mountains. It is formed by two streams which unite in Lane co., and flows in a northerly direction, through a course of 250 m. to its confluence with the Columbia River.

Willard, Frances Elizabeth (1839-98), American philanthropist, reformer, and educator, was born in Churchville, N. Y. After teaching for several years in New York and Illinois, she was chosen president of the Ladies' College, at Evanston, Ill. When this institution became the Woman's College of Northwestern University she was made dean, and professor of *Æsthetics*. She resigned in 1874, and in the same year was chosen president of the Chicago branch of the Woman's Christian Temperance Union, an organization then in its infancy. In 1876 she began speaking for

woman's suffrage. She was a speaker of unusual eloquence and magnetism.

William I., called the **Conqueror** (1027-87), king of England, was the son of Robert the Devil, Duke of Normandy, and of Arlette, the daughter of a tanner of Falaise, where he was born. He succeeded his father as duke in 1035, but was not thoroughly established in power until 1047. In 1051, on a visit to England, his cousin, Edward the Confessor, is said to have offered him the succession to the crown of England and in 1064 Harold of Wessex also recognized the Norman duke's pretensions to the English crown. When, however, Edward the Confessor died, Harold refused to be bound by a promise which he said was extorted from him, and seized the throne. In consequence of this William invaded England, and defeated and slew Harold at the battle of Hastings or Senlac. He then gradually forced all England to recognize his royal title.

William II., called **Rufus** (?1056-1100), king of England, son of William the Conqueror, succeeded his father in 1087. An invasion of England by Malcolm III. (Canmore) led William to invade Scotland and to annex Cumberland. A long quarrel with Anselm, archbishop of Canterbury, arose out of the recognition of a pope and William was threatened with excommunication. William was slain, probably by accident, while hunting in the New Forest.

William III. (1650-1702), king of England, was the son of William II. of Orange, ruler of the United Provinces. In 1677 he married Mary, daughter of James, Duke of York, who in 1685 became king of England as James II. In 1688 William was invited by seven Whig peers to deliver England from the Stuart misrule and after the flight of James II. to France, the crown was offered to William and Mary. William's success was marred by the deplorable massacre of Glencoe in 1692. On May 19, 1692, the English naval victory of La Hogue ruined all chance of direct aid to James from France. In 1694 Queen Mary died.

From 1697 to 1700 William was occupied with the Spanish Succession question, but died before the outbreak of the war. William's reign marked the transition from the personal government of the Stuarts to the Parliamentary rule of the Hanoverians.

William IV. (1765-1837), king of England, was born at Windsor, the third son of George III., and succeeded his brother George IV. in 1830. He was popular with the nation owing to his genial and simple character, and his sympathy with Liberal principles. William

died at Windsor after a short illness, and was succeeded by his niece, Queen Victoria.

William I. (1797-1888), king of Prussia and German emperor, was the son of Frederick William III. of Prussia, and was born at Berlin. His reactionary sympathies at the time of the revolution of 1848 in Berlin made him very unpopular, and he was compelled to take refuge in England. In January, 1861, he succeeded to the throne of Prussia. In September, 1862, he called Bismarck to office. In 1866 the Austro-Prussian War broke out, and at the conclusion of the war the Prussian ascendancy in Germany was assured. The Franco-Prussian War of 1870-71 completed the triumph of William I. On Jan. 18, 1871, in the palace of Versailles, he was chosen German emperor.

William II. (**Friedrich Wilhelm Victor Albert**) (1859-1941), third German emperor (1888-1918) and ninth king of Prussia, was born in Berlin, the son of the Crown Prince Frederick and the Princess Victoria (Princess Royal) of England. William II. showed in all departments of imperial government, in all that concerned foreign relations, and in the management of army and navy, an irrepressible and exuberant energy. From the day of his accession he resolved to be his own master, and in 1890 called for the resignation of Bismarck from the Chancellorship. By cultivating friendly relations with Turkey he furthered German commercial and financial interests in the near East.

The Great War overshadowed the later years of the reign of William II. The Emperor's dealings with the radical Socialist party during the war and the armed merchantman controversy with the United States, resulting finally in the entrance of that country into the conflict, stand out among other great events of an eventful reign. With the defeat of German arms in the fall of 1918, and the spread of revolutionary propaganda, the Emperor's position became untenable and on Nov. 9, 1918, he abdicated the throne and fled to Holland, where he later purchased an estate at Doorn. Here the Empress died, 1921. On Nov. 5, 1922, the former Emperor married Hermine Schoenaich-Carolath, Princess of Reuss. By his first marriage William II. had six sons and one daughter.

William I. (1772-1843), king of the Netherlands, born at The Hague, the son of William V., the last hereditary stadtholder. He commanded the army of the Netherlands against France from 1793 until the subjection of the kingdom in 1795. After that he joined the army of Prussia. He served in the Austrian army, at Wagram (1809). On the downfall of

Napoleon, and the subsequent adjustment of European affairs, the Congress of Vienna decided that Belgium and Holland should be united under one sovereign, William I. He reigned till 1840, when he abdicated in favor of his son William II.

William II. (1792-1849), king of the Netherlands. In the Napoleonic wars he fought with Wellington in Spain, and commanded the Dutch army at Waterloo.

William IX. (1071-1127), duke of Aquitaine and count of Poitou, a celebrated Provençal poet. He joined the crusaders with the duke of Bavaria, but was entrapped by Alexis, emperor of Constantinople. William saved himself by flight.

William of Orange. See **William III.** (England).

William the Silent, Prince of Orange (1533-84), son of the count of Nassau, was born at Dillenburg in Nassau, and succeeded in 1544 to the principality of Orange. Charles V. appointed him governor of Holland, Zealand, Utrecht, and West Friesland, and sent him on several diplomatic missions. Philip II. on his accession accused William of Orange of stirring up the States-General against the royal measures. In 1561 William definitely headed the opposition in the Netherlands to Philip. In 1578 William and the Archduke Matthias were defeated by the Spanish troops at Gembloux. William then induced the Roman Catholic provinces to form the Union of Arras in January 1579, and to leave the Protestant provinces, which at once formed the Union of Utrecht. But William was himself assassinated. He was a great man; and to his patience, perseverance, and skill, the Dutch republic, as the seven united provinces were termed, owed its independence.

William and Mary College, an institution for higher education situated in Williamsburg, Va., the second oldest of American colleges. The project of a college was agitated as early as 1617, but the Indian massacre of 1622 postponed its execution until 1693, when there was established at Middle Plantation, now Williamsburg, a college, named in honor of the ruling monarchs, with the Rev. James Blair as its president. Its charter was received direct from the crown. In 1938 there was an enrollment of 1,200.

William Henry, a former fort, built in 1755 by Sir William Johnson on the site of the present Caldwell (officially Lake George), N. Y. It was an important strategic point in the French and Indian War.

Williams, Ben Ames (1889-1953), author, was born in Macon, Miss. Until 1916

he was a newspaper writer. Since then he has written many novels, including, *All the Brothers Were Valiant* (1919); *Black Pawl* (1922); *The Dreadful Night*; *The Strange Woman* (1941); *It's a Free Country* (1945).

Williams, John (1664-1729), American colonial clergyman, was born in Roxbury, Mass. He was graduated from Harvard in 1683; was ordained a minister five years afterwards, and became pastor of a church in Deerfield. On February 29, 1704, a party of French and Indians under Hertel de Ronville surprised the town, killed many of the inhabitants, among them two of Williams' children; and captured about three hundred others, including Williams, his wife, and his remaining children except one absent son. On the second day's march toward Canada Mrs. Williams became exhausted, and was tomahawked. Williams and the children reached Canada in safety, and there, after about a year's captivity, Williams and his son Stephen were bought by the French governor and returned to Mass. The daughter Eunice who was eight years old when captured, was retained by the Indians, adopted their language and customs, married an Indian brave, and could not be won from her savage life. She was the grandmother of Eleazar Williams, who claimed to be the lost dauphin. In 1707 John Williams published an account of his captivity under the title *The Redeemed Captive*.

Williams, Jonathan (1750-1815), American soldier, was born in Boston, Mass. He was engaged for several years in foreign trade, was for a short time private secretary to Franklin, and was later a commercial agent of the United States in France during the Revolutionary War, and 1805-12 was superintendent of the U. S. Military Academy at West Point. He planned and constructed the fortifications of New York Harbor, Castle Williams being named in his honor.

Williams, Roger (c. 1607-84), American apostle of religious toleration and the founder of the State of Rhode Island. With his wife, Williams sailed to join the infant colony of Massachusetts Bay, Dec. 1, 1630, and arrived in February following. He removed to Plymouth, became teacher of the church, and remained two years. While there he began his acquaintance with the Indians, notably with Massasoit and Canonicus. He became teacher at Salem in 1633, but his outspoken declaration that the colony could not derive title to its lands from the king, but only from the Indians, and his denial of the right of the civil power to punish violations of the 'first table' (the first four of the Ten Commandments) immediately

caused trouble. The court threatened him with banishment if he did not recant before the next General Court in October. He withdrew from the Salem church, but refused to recant and was ordered to leave the colony. He continued to teach in his own house, however, and the court determined in January to send him back to England. Having learned of this intention, Williams left Salem before the officers arrived, and made his way toward Narragansett Bay.

In 1636, with four companions, he settled on the present site of Providence. There he bought lands from Canonicus and Miantonomoh, and was joined by his family and some others of like mind with himself who formed a compact to be governed by the majority, but 'only in civil things.' The New England Confederacy having shut out the Narragansett settlement, ostensibly on the ground that it had no charter, Williams went to England (1643) to secure a charter. While there he published his *Key Into the Language of America* (1644), and a reply to Rev. John Cotton's justification of his banishment (see COTTON, JOHN). He also wrote an open letter to Parliament, entitled *Queries of Highest Consideration*, in which he advocated complete separation of church and state, and *The Bloody Tenent of Persecution* (1644). Through the friendship of Sir Henry Vane, he secured (1644) from Parliament a liberal charter. During King Philip's War, Rhode Island was for the first time subjected to Indian attack, though Williams in vain exerted his influence for peace. Williams' great ideas on toleration were far ahead of his time. He often stirred up strife but he himself was unselfish, truthful, and sweet-spirited. For a justification of the course of Massachusetts, consult Dexter's *As to Roger Williams* (1876).

Williamsburg, city, Virginia, county seat of James City co., between the James and York Rivers; 46 m. s.e. of Richmond. It is the seat of William and Mary College. The place was settled as 'Middle Plantations' in 1632, and was the capital of Virginia from 1699 until 1780. On May 5, 1862, Hooker's division of McClellan's army here overtook the rear columns of the retreating Confederates under Magruder. In 1927 a project was started to restore old Colonial Williamsburg to its 18th century detail, and up to 1935, over 400 modern buildings have been torn down, and 140 colonial buildings restored or rebuilt. Among the notable buildings not reconstructed is the Bruton Parish Church, said to be the oldest Episcopal church in continu-

ous use in America. J. D. Rockefeller Jr. contributed \$5,000,000 towards the undertaking; p. 6,735.

Williams College, a non-denominational institution of higher education for men, in Williamstown, Mass., chartered in 1793. It owes its origin to a bequest of Colonel Ephraim Williams, and was opened in 1785 as a free school. The college rose to importance under the presidency of Mark Hopkins (1836-1872), and ranks high among smaller colleges.

Williamsport, city, Pennsylvania, county seat of Lycoming co., on the west branch of the Susquehanna River, is an important lumber market; p. 45,047.

Willkie, Wendell Lewis (1893-1944), U. S. business man, attorney, politician and author, was born in Elwood, Ind. He was Republican nominee for the presidency June 28, 1940, but was defeated in the election. After a world tour in 1942 he wrote *One World* (1943).

Will-o'-the-Wisp, or **Ignis Fatuus**, a luminous meteor, generally of a pale bluish color, seen over marshes and graveyards; it is supposed to be due to gases emanating from decaying vegetable or animal matter.

Willow, a name given to a number of species of trees included in the genus *Salix*. They have smooth, polished bark, long, slightly notched leaves, and silky, erect, barren catkins. They grow readily from cuttings. The twigs of some are used in basketry.

Wills, Helen N. (Mrs. Aidan Roark) (1906-), American tennis player; born Centerville, Calif. She won the American championship 1923-29, except 1926; also the championships of England and France 1927-30, and was national singles champion in 1931. An exhibition of her paintings and drawings was held in New York, 1930.

Wills' Coffee-House, London, a famous resort in the time of Queen Anne, in Russell Street, at the end of Bow Street. It first bore the title of the Red Cow, then of the Rose. Dryden was the first to make it the resort of the wits of his time.

Wilmington, city and port of entry, Delaware, county seat of New Castle co. and largest city of State, is situated on the Delaware River, 24 m. s.w. of Philadelphia. The city has ten parks, comprising some 650 acres, the most notable of which is Brandywine Park. Features of interest are Holy Trinity, (Old Swedes') Church, one of the oldest buildings in the United States which has been continuously used as a church since its erection (1698); Saint Peter's Orphanage; Ferris In-

dustrial School for Boys; Friends' School; public library; and the Delaware, Homœopathic, and Physicians' and Surgeons' hospitals.

Wilmington is an important industrial city. The principal manufactures are steel, iron, and foundry products, chemicals, paper, vulcanized fibre, explosives, dyes, rubber hose, plumbing supplies, leather (especially morocco), ships, furniture, cotton goods. The Dupont powder plant, the largest in the world, is located two miles from the city. Fort Christina, named in honor of the daughter of Gustavus Adolphus, was erected by the Swedes on the site of the present Wilmington in 1638, and a Swedish settlement was made here, called Christinaham. In 1745 the present name was adopted in honor of the Earl of Wilmington; p. 110,356.

Wilmington, city and port of entry, North Carolina, county seat of New Hanover co., is situated on the Cape Fear River, twenty miles from its mouth. Wilmington is essentially a commercial city; cotton, lumber and naval stores are extensively shipped, and shipbuilding is one of the most important industries. The first settlement was made here in 1730. The first open armed opposition to the Stamp Act took place here in 1765; p. 45,043.

Wilmot, David (1814-68), American jurist, was born in Bethany, Pa. He is chiefly remembered for having introduced in 1846 the famous amendment known as the Wilmot Proviso. He left the Democratic party on the slavery issue and became a Republican.

Wilmot Proviso. On August 8, 1846, after the outbreak of hostilities with Mexico, President Polk asked that \$2,000,000 be appropriated in order to adjust the boundary dispute which had brought on the war. David Wilmot proposed an amendment to the request to the effect that in any territory which should be acquired from Mexico, 'neither slavery nor involuntary servitude shall ever exist in any part of said territory, except for crime, whereof the party shall first be duly convicted.' This Proviso passed the House, but was rejected by the Senate.

With the Kansas-Nebraska Bill of 1854, the Proviso idea became the leading political principle of the Republican Party, which was formed as a protest against the Kansas-Nebraska Act. In 1857 the U. S. Supreme Court held that Congress did not possess the power to apply such a principle to a Territory; but the Republican Party maintained the contrary, and in June, 1862, a bill embodying the Proviso idea of forbidding slavery in the Territories was enacted into law by Congress.

Wilson, Alexander (1766-1813), American

ornithologist, born in Scotland. In 1794 he came to the United States. In order to make a collection of American birds he travelled in 1804 through the wilderness to Niagara Falls. He brought out the first volume of his work on ornithology in 1808; and the seventh volume appeared in 1813. The eighth and ninth volumes were published after his death. Wilson was the first to study American birds in their native haunts, and his descriptions are still remarkable for fidelity and truth.

Wilson, Allen Benjamin (1824-88), American inventor. In 1851 he invented the four-motion feeding plate, which was subsequently adopted in nearly all machines, and he also devised the rotating hook and stationary bobbin. In 1852 he entered into partnership with Nathaniel Wheeler, and established the Wheeler & Wilson sewing machine manufactory at Bridgeport, Conn.

Wilson, Francis (1854-1935), American actor, made his first appearance in legitimate comedy in Philadelphia (1878). He organized a company of his own, in which he played leading comedy rôles in *The Oolah*, *The Merry Monarch*, *The Little Corporal*, *The Monks of Malabar*, *The Toreador*, and other plays. After 1905 he was engaged in legitimate comedy under the management of Charles Frohman, appearing in *Cousin Billy*, *The Mountain Climber*, *When Knights Were Bold*, *The Bachelor's Baby*, and *The Spiritualist*. He has published a number of works on the stage and the life of acting.

Wilson, George Grafton (1863-), American educator and publicist, was law professor at Harvard (1910-36); lecturer on law at the U. S. Naval War College (1900-37).

Wilson, Harry Leon (1867-1939), American author, was born at Oregon, Illinois; was editor of *Puck* (1896-1902). With Booth Tarkington wrote the play *The Man from Home*. His novels include *Ruggles of Red Gap* (1915); *Merton of the Movies* (1922); *Exit* (1931).

Wilson, Henry (1812-75), American political leader, legislator, and executive, was born in Farmington, N. H. His original name was JEREMIAH JONES COLBAITE, but he adopted that of Henry Wilson on attaining his majority. He was apprenticed to a farmer during his minority; in 1833 went to Natick, Mass., where he learned shoemaking; and subsequently built up a large shoe manufacturing business there. He was a member of the Senate for eighteen years, and was noted for his ability, industry, and courtesy. After the Civil War he took a prominent part in re-

construction, advocating full civil rights for the negroes and generous treatment of the Southern white people. In 1872 he was the successful candidate of the Republican Party for Vice-President, on the ticket with General Grant. The chief one of his published works is *History of the Rise and Fall of the Slave Power in America* (3 vols., 1872-5; unfinished).

Wilson, James (1835-1920), American public official, born in Ayrshire, Scotland. He was educated at Iowa College, and after 1861 engaged in farming. From 1897 to 1913 he was U. S. Secretary of Agriculture in the Cabinets of Presidents McKinley, Roosevelt, and Taft.

Wilson, James Cornelius (1847-1934), American physician, was born in Philadelphia. He was attending physician at the Philadelphia Hospital (1876-90); emeritus professor of the practice of medicine, Jefferson Medical College; emeritus physician to the Pennsylvania Hospital; emeritus physician-in-chief at the German Hospital; and consulting physician at numerous other hospitals. One of his best known books is *A Hand Book of Medical Diagnosis*.

Wilson, James Grant (1832-1914), American soldier, author, and editor. After the Civil War he settled in New York City. He was the intimate friend of many notable men, including Washington Irving, William Cullen Bryant, Lincoln, Dickens, Thackeray, and Gladstone.

Wilson, William Bauchop (1862-1934), American public official, was born in Blantyre, Scotland. He came to the United States with his parents in 1870, and settled in Tioga co., Pa. He worked in the coal mines (1871-98); helped to organize the United Mine Workers of America (1890); and was its international secretary and treasurer (1900-08). From 1907 to 1913 he was a Member of Congress. In 1913 he became Secretary of the newly organized Department of Labor in President Wilson's Cabinet, and served until 1921.

Wilson, (Thomas) Woodrow (1856-1924), twenty-eighth president of the United States, was born in Staunton, Va., Dec. 28, 1856. His father was a Presbyterian clergyman and professor of theology, the son of an Ulster immigrant. His mother, Jessie Woodrow, was the daughter of a Scotch clergyman. In 1858 the family removed to Augusta, Ga. He studied law at the University of Virginia, and practised in Atlanta, Ga., in 1882-3. From 1886 to 1888 he was associate professor of history at Bryn Mawr; and from 1888 to 1890 professor of history and political economy at Wesleyan, whence he was called to the chair of jurisprudence and political economy at Prince-

ton. In 1902, he was chosen the first non-clerical president of Princeton University.

During his years as a professor and University president, Wilson wrote much on history and politics and attained a reputation as a forceful public speaker and as an authority on methods of constitutional government, so that his public career may be said to have begun even before his direct entry into political life. He was elected governor of New Jersey in 1910, and carried through a line of political and social reforms relating to direct primaries, a public service commission, commission government, the civil service, the State School system, corrupt practices, the incorporation of trusts, hours of labor for women, the indeterminate sentence, widows' pensions, and a scientific poor law.

In 1912 Wilson was elected President of the United States, defeating Theodore Roosevelt and William H. Taft, the Progressive and Republican candidates.

Wilson's career in the ensuing months is so closely identified with the history of the United States and its part in the war that the reader is referred to the articles on UNITED STATES and EUROPE, GREAT WAR OF, for the events of that period. On Jan. 8, 1918, he laid down his celebrated Fourteen Points as a basis of peace with Germany; on Sept. 27 he declared that a League of Nations must be 'in a sense the most essential part' of a peace settlement, and in the exchange of messages preliminary to the signing of the armistice he played the important part of intermediary between Germany and the Allied Powers. The Fourteen Points were eventually accepted (with reservations) by both sides, and the Armistice was signed on Nov. 11, 1918.

President Wilson sailed for Paris on Dec. 4, 1918, and before the assembling of the Peace Conference visited England and Italy. There as in France he was welcomed with great public demonstrations and hailed as a popular hero. At the Peace Conference the President's position was one of great difficulty. The general principles upon which peace had been concluded admitted of varying interpretations, and Wilson was severely criticised for compromises which were designated by his opponents at home as a 'surrender to European imperialism.' The proposed League of Nations was also bitterly assailed. As chairman of the commission for drafting the constitution of the League, President Wilson presented the text of the Covenant to the Conference on Feb. 14, and it was adopted. Almost immediately he sailed for America to plead the cause of the League, which he declared was inextricably

interwoven with the Peace Treaty. He returned to France in March and after the signing of the Treaty on June 28 once more sailed for home. On July 10 he laid the Treaty before the Senate, and on Sept. 3 started a tour of the country to plead for America's adherence to the League.

Repeated efforts to secure the necessary two-thirds vote in the Senate for ratification of the Peace Treaty failed and it was made the issue in the coming presidential election. Wilson's failing health prevented his active participation in the campaign of 1920 and after his retirement from office he took no further part in political life. In his last public address, on Nov. 10, 1923, the eve of Armistice Day, he made his final plea for the League and held forth the hope that America might yet prove 'that there is at least one great and powerful nation which can turn away from programmes of self-interest and devote itself to practicing and establishing the highest ideals of disinterested service and the consistent standards of conscience and of right.' In December, 1920, the President was awarded the Nobel Peace Prize. He died at his home in Washington on Feb. 3, 1924. He was buried in the crypt of the National Cathedral on Mount St. Albans, Washington. D. C. Woodrow Wilson's publications include many authoritative books on government and politics, some of which are used as textbooks.

Wilton Carpet, a carpet with a velvet or plush surface woven over flat rods instead of the round wires used in making Brussels carpet.

Wiltshire, inland county of England. The country is hilly throughout the greater part. The industries are chiefly agricultural—dairy farming predominating in the n., and grazing in the s. Wiltshire is noted for its antiquarian remains.

Wimbledon, a suburb of London. The town is celebrated for its grounds for tennis, cricket, and other sports. An ancient earthwork nearby is traditionally ascribed to Caesar, and there are remains of a British camp; p. 59,520.

Wimple, a cloth usually white and of linen, worn in folds about the neck and over the head leaving only the face exposed. Most orders of nuns wear the wimple.

Winant, John Gilbert (1889-1947), U.S. diplomat, was educated at Princeton; was army captain in World War I; governor of New Hampshire (1925-26; 1931-34); head of the Social Security Board (1935-37);

ambassador to England (1941-46).

Winchell, Walter (1897-), American newspaper writer who contributed many expressions to American slang. Once a vaudeville song-and-dance man, he left the stage to write a column of Broadway gossip for the New York *Evening Graphic*, subsequently transferring his column to the *Daily Mirror*, whence it was widely syndicated.

Winchester, city, Hampshire, England, 60 m. s.w. of London. It is a place of great antiquity, the *Caer Gwent* of the Britons and the *Venta Belgarum* of the Romans. The chief object of interest is the Cathedral, the largest in England (557 ft. in length). The central tower fell in 1107, but was soon rebuilt. This great edifice forms the substantial part of the present Cathedral, and is visible in places. The Castle, built soon after the Conquest, was later enlarged, especially in the reign of Henry III., whose birthplace it was; and from this period dates the present style of the Great Hall, the only portion remaining, now used as the county hall, and containing King Arthur's Round Table. Hyde Abbey (a ruined gateway only existing) was the burial place of King Alfred and other Saxon princes. Winchester College was founded in 1387; p. 22,970.

Winchester, Oliver Fisher (1810-80), American manufacturer, born in Boston. He became a shareholder in the Volcanic Arms Company, and got control of the company and reorganized it as the New Haven Arms Company. In 1865 he formed the Winchester Repeating Arms Company.

Windermere, the largest lake in England, in the Lake District, is over 10 miles long; it is a popular resort.

Windmills are believed to have been first introduced into Europe in the 8th or 9th century. The principle of action in the windmill is very similar to that in the water turbine. The wind acts upon four or more sails or sweeps radiating from a shaft and set at an angle with the wind's direction. As the direction of the wind is somewhat variable, provision is made for bringing the sails to face the wind.

Provision is made for adjusting the amount of sail area to the strength of the wind, generally by 'reefing' the sails. There has been a great development in the manufacture of small power wind-pumping engines. Instead of four to six sails of large width, there are a number of thin sheet-steel sails or blades arranged radially round a shaft, and forming a wheel. Control is effected by mounting the

wheel on a revolving head and providing a rudder or tail-vane, which will allow the wheel to run into the wind, or throw the wheel more or less out of the wind. The sails move with about 2.5 times the velocity of the wind. The wheel is mounted on a tower usually built of steel angles suitably braced.

Windows. The earliest example of windows playing any important part in architectural construction are the clerestory lights in the great temples and palaces of Egypt, and in the Assyrian and Persian palaces, where large roof windows were formed with timber not unlike modern deck lights; these, of course, were open to the elements. In Roman houses the *atrium*, or principal hall, was open to the roof, while the rooms entering off the same were lighted only by the doors. Later they had windows protected by shutters, and a transparent material, probably mica, was used for glazing, till in the 2d century horn came into general use. In the middle ages cloth seems to have been used.

Windpipe. See *Trachea*.

Wind River Mountains, range of mountains in W. Wyoming, a part of the Rocky Mountain system.

Winds, or air in motion, are the result of differences in atmospheric pressure, whereby the air is forced to move from a place of high barometric pressure toward a place of lower pressure. The surface winds of the globe may be broadly classified into the following divisions: 1. An equatorial belt of calms and clouds known as the doldrums, where the movement of the air is chiefly upward, and whose position shifts a few degrees northward and southward with the seasonal movement of the sun. 2. On both sides of the doldrums are belts of trade winds, blowing steadily from the n.e. in the northern hemisphere and from the s.e. in the southern hemisphere, and also shifting in latitudinal position from spring to fall, reaching the northern limit of 35° in September. 3. Between the trades and the poles come the prevailing westerly winds of the temperate latitudes. These general winds of the globe owe their origin to the difference in temperature between equator and poles, and their direction is due to this cause and also to the rotation of the earth.

In addition to the general winds some are local or temporary, such as the storm winds; and the interchange of air between land and water—called land and sea breeze when it extends but a short distance from the shore, called monsoon when it sweeps from the sea into the overheated continent during the sum-

mer, from the cooled land to the warmer sea in winter. The wind increases in velocity with height above the earth's surface, since in the higher levels it is less retarded by friction against the ground. Consult bulletins on winds from the U. S. Weather Bureau.

Windsor, parliamentary and municipal borough and market town, England, 22 m. w. of London. The present town replaced an older one, now represented by the village of Old Windsor, about 2 m. to the e. William the Conqueror built a fortress on the hill now occupied by Windsor Castle, and around this grew up the new town; p. 20,115.

Windsor, city, Ontario, Canada, across the Detroit river from Detroit, Mich. There are manufactures and the district produces fruit, tobacco, and large deposits of rock salt. Windsor was settled in 1820; p. 62,957.

Windsor Castle, the chief royal palace of England, stands on an eminence near the Thames, in Windsor, Berkshire. The buildings and immediate grounds cover an area of 12 acres. A terrace surrounds the castle on the n., e., and s., sides; below, on the e., is the sunken garden, opposite the private apartments; and on the n. are the ornamental pleasure grounds, known as the 'slopes.' The Great Park, of about 1,800 acres, is traversed for three miles by a magnificent avenue known as the Long Walk, terminated by Snow Hill, an eminence surmounted by a statue of George III., and having by the side of it the royal palace and mausoleum of Frogmore, in the latter of which rest the remains of the Prince Consort and Queen Victoria. Virginia Water, an ornamental lake, lies in the park.

Windsor, Duke of, a title given by King George VI to his brother David Windsor on December 12, 1936, two days after his abdication as Edward VIII, King of Great Britain and Ireland and Emperor of India. (See EDWARD VIII, ABDICATION OF.)

Windward Indies. See *West Indies*.

Wine, an alcoholic beverage produced by the fermentation of grape juice. The term wine is also applied to various other fermented products. Wines are distinguished by their color, flavor, bouquet or aroma, taste on the palate, and as still or sparkling. These points of difference depend on the variety of grapevine, the soil and site of the vineyard, and the difference in the mode of manufacture and finishing. Thus, if fermentation is stopped before all the sugars have been decomposed, a 'sweet,' or 'fruity' wine is the result, in contradistinction to 'dry' or 'sour' wines, in which all the sugar has been fermented away. Effec-

vescing or sparkling wines are caused by the presence of carbon dioxide.

The chief characteristic of a wine is the quantity of alcohol present. When the whole of the alcohol has been produced by fermentation, and this rarely exceeds 14 or 15 per cent. by volume, the wine is said to be a natural one. All others containing above this limit are spoken of as fortified or brandied wines. Light wines—as burgundy, clarets, hocks—contain from 7 to 12 per cent. of alcohol; while the strong, fortified ones range from 16 to 35 per cent.

All wines may be classed as beverage wines or fine wines. Of the latter, few are manufactured due to the care and time required to produce a highly superior wine. The better known modern wines include *burgundy*, natural, rich-flavored, medium in alcohol content, low in tannin, and either red or white; *champagne*, sparkling, due to carbon dioxide gas properly produced by fermentation within the bottle; *claret*, red, natural, and of a great variety of quality; *port*, strongly fortified, red in color, and produced legally only at Oporto (Porto Port), Portugal; *sauterne*, white, sweet, containing in one type a considerable amount of sulphurous acid; *sherry*, light golden, and strongly fortified; *tokay*, mellow amber, the finest wine produced in Hungary. Consult Schoonmaker and Marvel's *The Complete Wine Book* (1934).

Winnebago, a tribe of Indians, whose linguistic family is the Sioux. There are about 1,200 in Wisconsin and about 1,000 in Nebraska.

Winnebago, Lake, is situated in Wisconsin, 30 m. in length and 10 m. in breadth at its widest part. It constitutes part of the course of the Fox River.

Winnepesaukee, or Winipiseogee, Lake, is situated in New Hampshire, about 27 m. n.e. of Concord. It is 21 m. long. The scenery is picturesque, and the shores are bordered by summer cottages.

Winner, Septimus (1827-1902), American musician, was born in Philadelphia. He is best known as the composer of popular songs, of which several, as *Listen to the Mocking Bird* (1855), *What is Home Without a Mother?* (1854), and *How Sweet are the Roses* (1850), are familiar all over the country. His *Gems of the Opera*, easy transcriptions of popular operas, attained an immense circulation.

Winnipeg, city, Canada, capital of Manitoba. Its name is taken from Lake Winnipeg, an Ojibway term for 'muddy water.' The climate is healthful, the air being dry and

bracing. The city is situated on the prairie in an extremely fertile part of the province, the bed of an ancient and extinct lake known to geologists as Lake Agassiz.

The University of Manitoba is situated here. Four colleges, Saint John's (P. E.), Manitoba (Presb.), Wesley (Meth.), and Saint Boniface (R. C.), are affiliated with the university. Winnipeg is also the seat of the provincial normal school, of Ruperts' Land College (P. E.), and of Saint Mary's Academy (R. C.) for girls. The city commands the trade of a vast region to the n., e. and w., to the foothills of the Rockies. The immediate neighborhood supplies wool, flax, hides, brick clay, glass sands, spruce timber, gypsum, peat, salt, and manganese; p. 354,069.

Winnipeg, Lake, in Canada, 40 m. n. of Winnipeg. It is about 250 m. long and 60 m. wide, covering an area of 8,555 sq. m. Its maximum depth is 65 ft. Islands are numerous.

Winnipegosis, or Winnipegosis, Lake, known also as **Little Winnipeg**, lies about 50 m. w. of Lake Winnipeg, in Manitoba and Keewatin. Its length is 125 m. n. and s.

Winona, city, Minnesota, 100 m. s.e. of St. Paul. Educational institutions include a State Teachers College, Teresian University, St. Mary's College. Industrial establishments include railroad shops, a packing plant, and manufactures of agricultural implements, flour, and lumber. The first settlement here was made in 1851; p. 25,031.

Winslow, Edward (1595-1655), Governor of Plymouth Colony, was born in Droitwich, near Worcester, England. In 1617 he went to Leyden, and in 1620 sailed to Southampton in the *Speedwell* and from thence to New England in the *Mayflower*. He was elected governor in 1633, 1636, and 1644. After 1649 he was employed in England by the government. He wrote several controversial pamphlets denouncing the policy of religious toleration of John Child and William Vassail. Among his other published works is *The Glorious Progress of the Gospel amongst the Indians* (1649).

Winslow, William Copley (1840-1925), American archaeologist and writer, was born in Boston. In 1883 he founded the American branch of the Egypt Exploration Fund, and was its chief officer in the United States until 1903. In 1908 he became representative of the Egyptian Research Account (conducted by Petrie) in the United States. He was the author of archaeological books and editor of the *University Quarterly* (1860-2), assistant editor of the *New York World* (1862-3), and

editor of the *Christian Times* (1864-5), *American Antiquarian* (1890-1908), and *Biblia* (1888-1910).

Winsor, Justin (1831-97), American historian, was born in Boston. During 1868-77 he was superintendent of the Boston Public Library, and from 1877 until his death was librarian of Harvard. He founded the American Library Association.

Winston-Salem, largest city in North Carolina. It is the seat of Salem College for women, and the Slater Industrial School. The city is located in a rich agricultural district and is a center of tobacco manufacture; p. 87,811.

Winter, the coldest season of the year, defined astronomically as beginning, in the northern hemisphere, with the sun's entry into the sign of Capricorn, about Dec. 21, and terminating at the vernal equinox.

Wintergreen, also called teaberry and boxberry, an aromatic, low-growing shrub (*Gaultheria procumbens*) with bell-shaped flowers and scarlet berries, the source of the pungent flavoring 'wintergreen.'

Winterthur, town, Switzerland, 17 m. n.e. of Zürich. It has important manufactures, particularly of textiles, locomotives, and machinery; p. 53,925.

Winthrop, Fitz John (1638-1707), American colonial governor, was born in Ipswich, Mass. He was agent for Connecticut in London, 1693-97, and governor in 1698-1707.

Winthrop, John (1588-1649), colonial governor of Massachusetts, was born in England. His studies in Trinity College, Cambridge, were interrupted by his marriage to Mary Forth in 1605. The political and religious condition of England was unsatisfactory to a man of his views and temperament, and he decided to go to America. A group of colonists left England March 22, 1630, and arrived in Salem Harbor June 22. On the voyage Governor Winthrop composed a hortatory tract entitled *Model of Christian Charity*.

In 1632 the right to vote for governor was restored to the freemen, and in 1634 Winthrop was chosen deputy-governor. In 1637 he was elected governor, being re-elected yearly until his death. During his entire life in New England Winthrop kept an elaborate journal, of which two of the manuscript volumes were printed in Hartford in 1790 by Noah Webster. The third volume was found in the tower of the Old South Church in Boston in 1816, and the whole was published as a *History of New England, 1630-49*, edited by James Savage, in 1825-6 (2 vols.). A new edition was printed in 1853.

Winthrop, John (1606-76), American colo-

nial governor of Connecticut, was born in Suffolk, England, the son of John, afterwards governor of Massachusetts, and his first wife, Mary Forth. In 1631 he went to Massachusetts. He took part in the settlement of Ipswich in 1633, went to England in 1634, and returned with a commission from Lord Say and Sele, and Lord Brook, authorizing him to build a fort at the mouth of the Connecticut River, and to act as governor or commander for a year. This post, called Saybrook, cut off the Dutch from the control of the river. He was governor of Connecticut in 1657-8, was again elected in 1659, and served until his death. He was instrumental in securing from Charles II. the extremely liberal charter of 1662.

Winthrop, John (1714-79), American physicist, was born in Boston. In 1761 he visited Newfoundland in a ship provided by the province of Massachusetts to observe the transit of Mercury, probably the first scientific expedition to sail from America.

Wintun, a linguistic family of North American Indians formerly occupying the upper valley of the Sacramento River.

Wire, a thin thread-like rod or strand of metal. Wires are made of numerous alloys, as iron and carbon, making steel wire, iron-nickel, brass, iron-aluminum, and copper-nickel. Wire attains its shape and size by being drawn through a die, which is a tapering hole usually in a steel block. There have been numerous machines invented for drawing wire through as many as twelve dies at one time. For very fine wires, dies of precious stones, such as diamonds and rubies, are used.

Commercially, the standard sizes of wire conform to certain recognized gauges. A special gauge has been developed for measuring electrical wires in units which are called circular mils. Steel wires of great strength have been made of late years, 130 tons tensile strength per square inch being quite common. Wires of great length have been drawn without weld or joint. A silver wire 170 m. long has been drawn through a ruby which was 1-300 of an inch in diameter. Platinum wire of great fineness has been drawn by covering the platinum with silver, then drawing this down as fine as practicable, and dissolving the silver off, leaving the platinum. This wire was calculated to be 1-30,000 of an inch in diameter, and was intended to take the place of spider lines in telescope and other scientific apparatus.

Wireless Telegraphy, the electrical transmission of intelligence couched in telegraphic code across space without the use of connecting wires. From the time when Maxwell first published his electromagnetic theory of light in

1865, advancing the contention that light consisted of combined electric and magnetic waves in space, the possibility of generating other electromagnetic waves, differing from light waves only in length, was inferred.

Hertz' Apparatus.—Hertz in 1887 grouped these elements in a manner such that they were symmetrical with respect to space and could therefore set up waves in space which could be detected by similar symmetrical apparatus. Plates A and B of Fig. 1 constitute the capacity

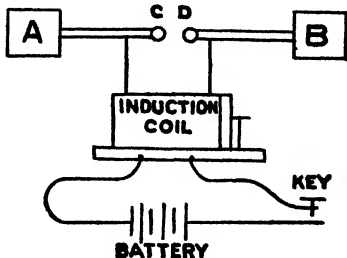


Fig. 1. Hertz Oscillator.

of the oscillatory discharge circuit, and the rods attached to these plates provide the necessary self-inductance. Gap CD fulfils the same purpose as switch S of Fig. 1, since its resistance is extremely high, until the potential difference between C and D is raised to such a high value by the battery through the induction coil that the gap breaks down. When the signalling

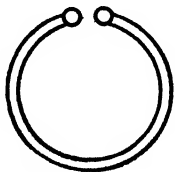


Fig. 2. Hertz Resonator.

key is depressed, the battery energizes the induction coil, which has a buzzing interruptor of much the form of a doorbell. This interruptor gives alternate surges of current which build up to very high values in the induction coil sufficient to break the gap CD down once for each interruption. The current then surges back and forth between plates A and B through the now fairly low resistance of the gap. The spread of the plates A and B gives rise to the electromagnetic waves which radiate outwards. Due to the low capacity and inductance of the arrangement, the oscillations are extremely rapid, upwards of a hundred million

a second. As the frequency of radio waves is tied up with their length by the simple ratio

$$\text{radio wave length in meters} = \frac{\text{frequency}}{300 \text{ million}} \quad (4)$$

the wave length of Hertz' transmission was of the order of one-third of a meter, as contrasted with the three hundred meters of the lower broadcast band. But due to their very high frequency, most of the energy was radiated rather than used up in the resistance of the circuit. This was fortunate, as otherwise their presence might not have been detected in the extremely inefficient detector that he used. This consisted of simply a ring resonator shown in Fig 2. The inductance and capacity of this ring were such as to be in tune with these very short waves, and when the ring was brought near the transmitter tiny sparks were seen to jump across the gap for every spark of the transmitter.

Marconi's Improvements.—Guglielmo Marconi in 1896 made a practical device of it by inventing the antenna. In his first successful experiments he used a single vertical wire broken by a spark gap, the lower end being grounded and the upper elevated in the air. It will readily be seen that by so doing he enormously increased the effective size of the radiating circuit of Hertz' apparatus, the earth now acting as one plate of the circuit condenser. The elevated antenna acts as the other plate and as the inductance of the circuit. Marconi found, as could have been expected, that the higher his antenna, the greater the effective communicating range of his transmitter. Using his modified Hertzian oscillator and the lately developed coherer (see below), Marconi was able in 1899 to establish wireless communication between two British cruisers, demonstrating conclusively the practicability of this new form of communication.

Neither Hertz' oscillator nor Marconi's earliest installations were strictly syntonetic. That is to say, the radiating circuit did not oscillate at only a single fixed high frequency.

The self-inductance of the high frequency oscillating electrical circuits constitutes the mass inertia, and their electrostatic potential, the potential energy of the system, and these circuit constants determine the oscillation frequency, which can thus be lowered by increasing either the inductance or the capacity, and conversely raised by decreasing them. A non-syntonetic oscillating circuit must radiate an enormous amount of power to set up oscillations in a non-syntonetic receiving circuit such as Hertz' resonator, even over short distances, while if it were possible to tune the

receiving to the sending circuit, the latter could set up quite appreciable currents in the former while radiating electromagnetic waves of comparatively insignificant power, provided that these waves were continued for a sufficient length of time. This last requirement calls for the lowest possible decrement for the most efficient wireless telegraphic system.

The energizing circuit consists essentially of a source of low-voltage, low frequency power, shown here as alternator A, the signalling key K, and the primary winding P of a step-up transformer. The storage circuit receives high-voltage, low-frequency power from the secondary transformer winding S and uses it to set up high-frequency oscillations

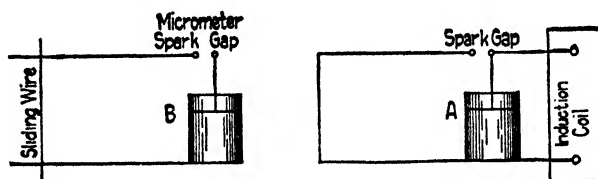


Fig. 3.

Sir Oliver Lodge was the first to recognize the importance of tuning in wireless telegraphic circuits, not only for achieving greater efficiency in communication, but also as a means of eliminating interference between numerous wireless transmitting stations operating simultaneously. The syntonistic system patented by Sir Oliver Lodge in 1897 is shown in figure 3. The sliding wire in the receiving

through spark gap C, condenser C, coupling inductance L_1 , and inductance L_1^1 . The radiating circuit, consisting of coupling inductance L_2 , tuning inductance L_3 , and the antenna, picks up high-frequency energy from the storage circuit and radiates it.

Early Methods of Reception.—1. *The coherer.* This device, invented by Edward Branly in 1890, was the basis of the first practical re-

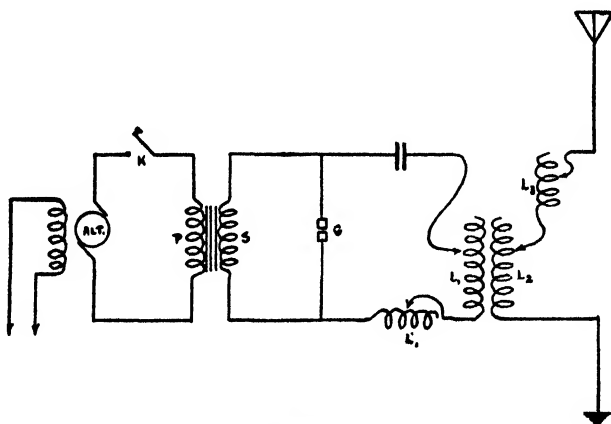


Fig. 4. Spark Transmitter.

circuit enabled the latter to be tuned roughly, and the capacity in the transmitting and receiving circuits was lumped in the Leyden jars A and B respectively, reducing the distributed resistance of the circuit and thus lowering its decrement.

A general circuit for the spark transmitter is shown in figure 4, divided into three main

ceiving circuit for radio waves. It depended on the ability of high frequency electric currents to reduce the normally high resistance of a loose mass of metal filings to a few ohms. As shown in figure 5, the coherer consisted of a non-conducting tube T filled with a mass of filings F and closed off at each end by the plug electrodes P. One of these plugs was connected

to a receiving antenna and the other grounded, and a galvanometer and battery connected in series across the coherer.

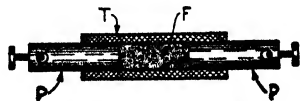


Fig. 5. Branly Detector.

2. *Magnetic Methods.* High frequency currents induced in a receiving circuit by radiated electromagnetic waves will affect the rate of change of the flux in a magnetic circuit. This effect, discovered by J. Henry in 1842, was the basis of a second type of receiver.

3. *Electrolytic Detectors* were based on the fact that high frequency oscillations will annul the electrolytic polarization of a pair of electrodes of small surface immersed in an electrolyte, and that this polarization will immediately reform at the cessation of the oscillations. Electrolytic detectors were quite sensitive and reliable in operation, their great drawback lying in their lack of ruggedness and need of frequent attention.

4. *Thermoelectric Detectors.* This class of instruments, developed by Fessenden in 1903, depended on the heating effect produced by oscillations in the receiver circuit when passed through a thermoelectric junction of two dissimilar metals. Heat so produced would of course cause a low frequency electric current to be generated at the junction and this steady current could be used to actuate a recording device.

5. *Reception by Rectification.* This method superseded all others for the receiving of spark signals. In it the signal oscillations are passed through a device of unilateral conductivity before reaching the telephone. Such a device, known as a rectifier, has far greater resistance towards the flow of electric current in one direction than in the other, and will thus pass to the telephone an asymmetrical alternating current.

The first form of rectifying detector used was the crystal, introduced by Pickard and Dunwoody about 1906. Many crystalline metallic salts possess very nearly unilateral conductivity when connected in a circuit by means of a sharp metallic contact point. Carborundum, galena, silicon, and chalcopyrites, for instance, possess this property to a marked degree, and were thus among the crystals most generally used for radio reception. About this same time, however, another form of rectifier was rapidly coming into prominence—the thermionic valve or vacuum tube. It had long been ob-

served (notably by Edison in 1883) that a metallic body heated to high temperatures would emit appreciable amounts of negative 'electricity.' In the light of our present knowledge of physics there is at all times an escape of electrons from a metallic body, and this escape is assisted by heating the body. Most of the electrons emitted by an isolated hot body will return to that body, since their emission leaves the body positive in charge and thus able to attract the negative electrons. It occurred to J. A. Fleming, however, that were a positively charged metal plate to be placed in proximity to the emitting body, the electrons would be attracted to the plate and never return to the hot body (usually a tungsten lamp filament). This flow of electrons of course constituted an electric current, and as the cold positive plate always attracted and never emitted current, the complete device had unilateral conductivity and could be used to replace the crystal detector in receiving circuits. Such rectifiers have become universally useful.

Continuous Wave Transmission.—It was not until the advent of the high-power three-electrode thermionic valve, or triode, that a completely satisfactory means of generating steady high-frequency currents was found, although many schemes were previously advocated. Modern wireless telegraph practice has virtually abandoned all other high frequency generation systems in favor of the oscillating vacuum tube circuit, not only because of its far greater efficiency but because the short wave lengths now generally conceded as best for radio communication require frequencies of the order of 10,000 kilocycles, and such frequencies cannot be practically generated by any other means.

Continuous Wave Reception.—The receiving of telegraph signals carried by a continuous train of electric waves is a problem which differs essentially from that of receiving spark signals.

It may safely be said that the enormous modern development of the wireless art is closely related to the development of the thermionic vacuum tube. An almost unlimited variety of tasks can be performed more simply and efficiently by means of the vacuum tube than by any other device. This fact was realized soon after 1906, when De Forest, by developing the three element tube or triode, from Fleming's diode, showed that the thermionic tube could be used for other purposes besides rectification, and a multitude of physicists and engineers have since concentrated all their energies on the development of its possibilities.

The Triode.—The flow of electronic current in the diode was not conveniently susceptible to control. De Forest found that by interposing a metal mesh or grid between plate and filament, the electron flow could be controlled by very small variations in the 'grid bias,' i.e. the potential of the grid with respect to the filament. In this form of tube the electrons

point where an appreciable number of electrons emitted from the filament are attracted to the grid itself, 'robbing' the plate current to produce grid current. Figure 6 illustrates graphically the action of the grid.

Triode as Detector.—The triode may be used to replace the crystal detector or the diode in damped wave receiver circuits. Connections

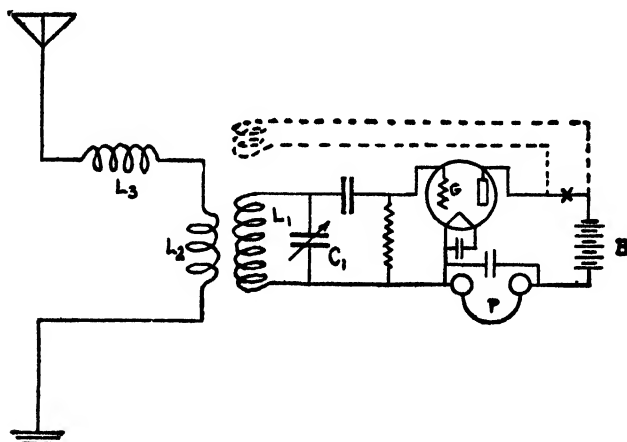


Fig. 7. Triode as Detector.

passing from the filament to the plate are forced to pass through the holes in the grid mesh. If the grid is negative with respect to the filament it will repel a portion of the electrons and prevent their reaching the plate; if neutral with respect to the filament it will merely impede the passage of electrons slight-



Fig. 6. Characteristic Curve of Triode.

ly; if positive with respect to the filament it will lend an attractive force assisting that of the plate, and thus increased grid potential will produce increased plate current up to the

for such use are shown in figure 7 (solid lines; and in such a circuit the triode is approximately five times as sensitive as the ordinary crystal. Its action is not that of a rectifier but rather that of a valve; each damped wave-train as fed into the grid G of the triode will lower the average potential of the grid for the duration of the train, and thus pulsations in grid voltage corresponding to the group frequency of the signal are set up. Such pulsations, as will readily be realized from a study of figure 6 will set up pulsations of corresponding frequency and far greater amplitude in the plate circuit, and these amplified pulsations become audible in the phones. If the plate circuit is opened at X and connections added according to the dotted lines, the signal may be amplified many times, due to the additive effect of pulsations induced in L_2 by L_1 on those already present in the plate circuit by grid action. This effect, discovered by Armstrong in 1916, was called regeneration, and is very seldom made use of in the latest receiving circuits.

Of course the receiver circuit of figure 7, since it is adapted only to the reception of signals consisting of wave groups recurring at an

audible rate, has a very limited application in wireless telegraphy today. For receiving the almost universally used continuous wave signals the heterodyne receiver already mentioned is used, triodes being used both as detector and as the local high frequency generator. The output of a tuned triode oscillator is fed into the grid circuit of the detector, where it beats with the incoming signal to produce an audible tone in the phones.

Triode as Amplifier.—It has already been pointed out that a small change in the grid voltage of a triode will vary the plate current to the same extent as a very much larger change in plate voltage. Generally speaking, a low voltage alternating current is impressed on a triode grid, resulting in a corresponding plate current of much higher effective voltage; this,

next higher stage is connected. Figure 8 shows a typical transformer-coupled amplifier. This amplifier has the advantage of higher possible amplification per stage, since the transformer ratio steps up the voltage, while the resistance-coupled amplifier will amplify all frequencies equally instead of favoring certain ones, as the transformer is apt to.

Modern receiving circuits all include thermionic amplification, both of the high-frequency signal before detection (radio amplification) and of the rectified or heterodyne signal after detection (audio amplification). In one popular circuit, the 'super-heterodyne,' the incoming high-frequency currents are first reduced by heterodyning to an intermediate frequency of about 175 kilocycles per second, and then heterodyned again to an

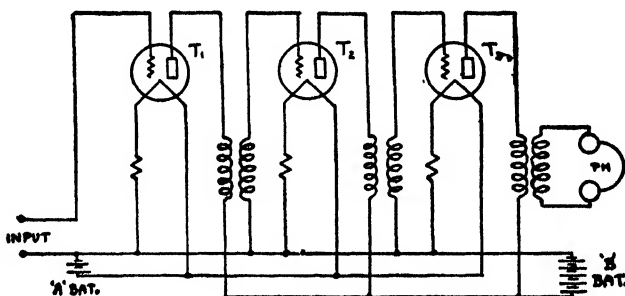


Fig. 8. Transformer Coupled Amplifier.

in turn, is fed to the grid of a second triode and amplified again, and so on. As many tubes as desired are cascaded in this fashion. It is possible to attain a voltage amplification as high as one million, but the practical limit in all but the most elaborate amplifiers is about five thousand.

It is necessary to use some sort of coupling means between successive stages of a triode amplifier, to shield the grid of each tube from the high voltage components of the current flowing in the plate circuit of the preceding tube, while passing on without attenuation the signal component. The two most common types of cascading are known as the transformer-coupled amplifier, in which the output circuit of the lower stage triode feeds into the primary winding of a repeating transformer, the secondary of which supplies the input of the higher stage; and the resistance-coupled amplifier, in which the plate voltage fluctuations of each stage are made to cause fluctuations in potential drop through a repeating resistor, across which the grid circuit of the

audible frequency, amplification taking place before and after each heterodyne stage.

Triode as Modulator—Vacuum Tube as Modulator.—Modulation, or the molding of continuous high-frequency oscillations or a continuous train of electric waves to a low-frequency signal, is essential to radio telephony, and it is largely due to the development of the vacuum tube as a modulator, within the past few years, that radio telephony has become practicable. The principle of modulation is illustrated in figure 9, in which *b* represents an unmodulated high-frequency speech-wave of rather complicated pattern, and *c* represents the high-frequency wave after modulation. The correspondence between the peaks of the voice-wave *a* and the points of maximum amplitude of the high-frequency wave *c* can readily be traced.

Many different modulator circuits have been devised. Only one of these, developed by R.A. Heising, and perhaps the most used, will be described here. In Figure 10, *o* is an oscillator tube supplying continuous high-frequency

oscillations to the antenna. Connected in parallel with the plate circuit of *o* is the plate circuit of the modulator tube *m*. The high-frequency choke coil prevents the oscillations generated by *o* from passing back to *m*. The tubes *o* and *m* are supplied with direct current energy from a common generator *B*. Connected to the grid circuit of *m* is a telephone transmitter *T*. The effect of speaking into the transmitter is to vary the grid potential of *m*, thereby causing the plate current of *m* to vary in accordance with the speech waves entering *T*. Due to the low-frequency choke coil, the generator *B* supplies a steady current to the two

internal electrical constants, and Schottky, Barkhausen, and A. W. Hall by 1918 had developed the several forms of the four-electrode tube to a degree where they found wide application in various radio circuits. It was not until 1928, however, that the use of these tubes became general.

The *screen-grid* four-electrode tube or Schottky tetrode, which has come into almost universal use in radio frequency, amplifiers both for wireless transmission and reception, is shown diagrammatically in figure 11. The inner grid, called the control grid, fulfils the same purpose as the triode grid. It is supported

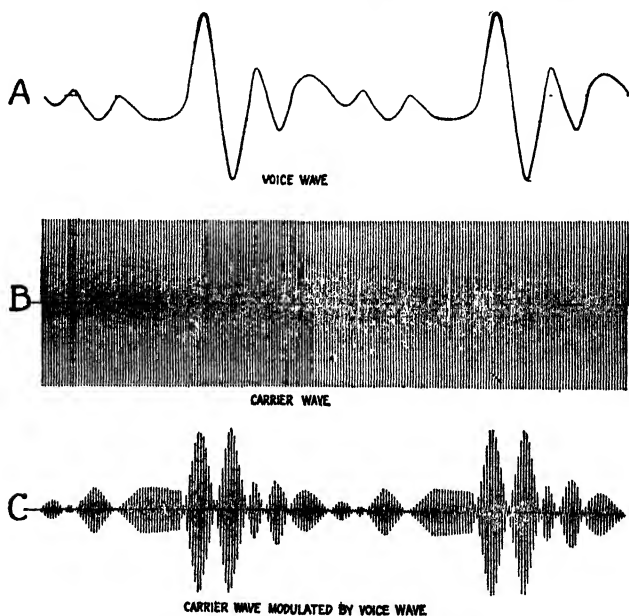


Fig. 9. The Modulation Principle.

tubes. Whenever *m* draws more current because of an increase in its grid potential, it decreases the current supplied the oscillator. This reduces the amplitude of the oscillations. On the other hand, when *m* draws less current, due to a lowering of its grid potential, *o* receives more current, and the amplitude of the oscillations becomes larger. The arrangement just described is suitable for wireless telephony. By replacing the telephone transmitter by a telegraph key it could be adapted to the purposes of wireless telegraphy, although some other arrangement might prove more efficient.

The Tetrode.—Langmuir in 1913 first suggested the possibility of using an additional grid or screen electrode in the triode to alter its

from the upper end of the tube, connection to it being made through a metal terminal cap and seal on the top of the bulb. The outer or screen grid surrounds the plate, and acts first of all as an electrostatic shield between grid and plate, reducing the grid plate capacity to a negligible quantity. It has, however, the further effect of greatly increasing the amplification factor of the tube.

Volume Control.—Some means of volume control, of maintaining the audio output at a constant level no matter what the amplitude of the incoming high-frequency signal, is a necessary part of all modern receivers, especially those designed for the reception of broadcast programs. A most satisfactory

means of effecting this volume control is by varying the control-grid bias of the radio amplifier tubes. For this purpose Stuart Ballentine and H. A. Snow developed the 'variable-mu' tetrode. This tube contains a special con-

ceiver circuits. The only one which seems at present (1931) to be of practical importance is the output pentode shown in figure 12. This tube, designed for use in the final stage of audio amplification in a receiver, may be re-

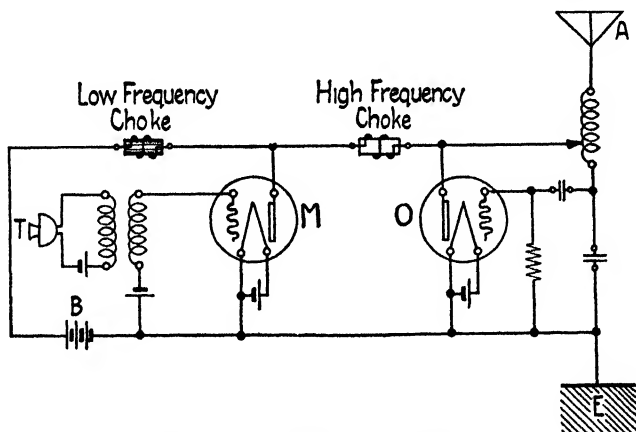


Fig. 10. Heising Modulator Circuit.

trol grid of fine mesh (the condition for high amplification factor) broken by gaps, which allows the audio output level to be changed by merely changing the negative D. C. bias on the control grid.

garded as a screen-grid tetrode to which an extra grid, held at cathode potential, is added between the screen grid and the plate, the effect of which permits the output pentode to be operated at much greater

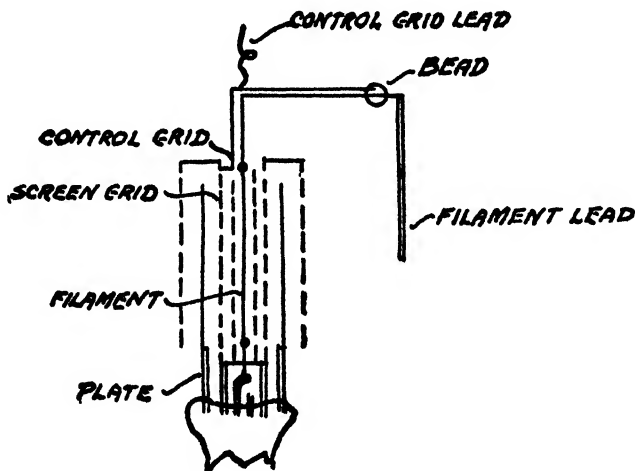


Fig. 11. Screen-Grid Tetrode.

The Pentode.—Several varieties of five-element tubes or pentodes, containing a cathode, a plate, and three grids, have been developed and advocated for various uses in radio re-

power efficiency than any other type of tube.

Radio Wave Propagation.—As the radiation spreads out from the antenna the waves increase in height. It was assumed by early ex-

perimenters that the upper portion of the waves attenuated indefinitely and so was lost, while the 'feet,' constituting the only received portion of the total radiation, traveled along the surface of the earth, being guided, conducted, and attenuated by the latter, acting as an isolated conducting sphere. Work done on this assumption indicated theoretical field strengths far too small to explain experimental

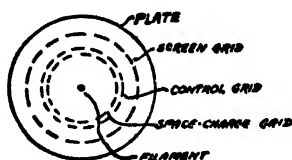


Fig. 12. Pentrode.

results, however, and the inadequacy of the theory was finally demonstrated by Watson and Van der Pol in 1919. Balfour Stewart in 1882 postulated the existence of a conducting layer in the upper atmosphere, resulting from the ionizing effect of solar radiation, and Kennelly in 1913 explained the experimental findings in radio propagation by propounding the theory that radio waves were refracted and reflected by this layer according to the prevalent strength of solar action.

While the importance of the Heaviside layer in radio propagation has been conclusively demonstrated, the physical dimensions, make-up, and location of the layer are yet to be definitely ascertained, as is the exact behavior of radio waves upon striking the layer. Echo signals, or repetitions of the original dots and dashes occurring after a short time interval, cannot be completely explained by assuming the radio waves to circle the earth directly or with successive simple reflections. These echoes, first reported by E. Quäck in 1926, sometimes are noted after time delays running up to several minutes, and it is believed that they may be caused by retardation of the wave in the Heaviside layer or by reflection from a second and higher layer.

Transmitting Antennae.—The main function of the antenna of a wireless telegraph transmitter is to radiate a maximum proportion of the energy fed to it. Directive antenna systems generally consist of groups of simultaneously radiating open oscillators, so fed by the transmitter that their respective radiation fields will be in phase only along a narrow cone or solid space angle, radiating in the desired direction and having the antenna system as an apex. In any other direction the radiation

fields tend to cancel each other so that all the energy radiated by the transmitter may be concentrated in a narrow beam. This system of beam transmission was first suggested by Marconi in 1923, and has since been developed by the staff engineers of RCA Communications Inc. and Marconi's Wireless Telegraph Co. Ltd.

Receiving Antennae.—The considerations entering into the design of receiving antennae are somewhat different from those affecting transmitting antennae. Early receiving antennae, indeed, were, like transmitting antennae, open oscillating circuits having a frequency of free oscillation equal to that of the incoming signals, which thus built up oscillations in the antenna for the receiving circuit to detect. The far more efficient modern wave antenna, however, operates on an entirely different principle.

Direction Finders.—The loop antenna, a very early type of directive antenna developed by Bellini and Tosi, is still of great importance because of its application to direction-finding receiver circuits. The loop antenna consists of a few turns of wire held in the form of an open square and forming the inductance of an oscillatory circuit. Inasmuch as the greatest difference in phase and consequent voltage is produced when received waves strike first one side and then the other of the loop, maximum oscillations are set up by signals traveling in a direction parallel to the plane of the loop. The loop is usually mounted vertically in such fashion that its plane may be made to point in any desired horizontal direction. To find the direction from which signals are coming, then, it is only necessary to tune condenser to the signal frequency, and then to rotate the loop until the signal strength is a maximum. The loop will then be pointing at the transmitting station. As a practical matter it is easier to determine the direction of minimum signals than the maximum, as the signals go through a very sharp zero point as the loop is turned at right angles to the true direction of reception. The radio compass or goniometer depends for its action upon the principle of the loop, and by its use ships are able to fix their bearings with respect to two or three transmitting stations of known location, and so by simple triangulation determine their own positions. Goniometers are used also in the location of illegal transmitting stations.

Radio Communication for Aircraft.—The form of antenna usually used consists of a trailing wire, weighted at the free end. This wire constitutes one half of a Hertz doublet, the metal parts of the airplane acting as the other

half. The trailing antenna can only be used while the ship is in flight, of course, and must be reeled in quickly when the plane is landing or going through a loop, but its efficiency compared with any other form of antenna suitable for aircraft more than compensates for these disadvantages.

Dead weight in airplanes must be kept to a rigid minimum, and consequently aircraft radio equipment must be as light as possible. Short wave channels are used for this work, so that compact, low-power vacuum tube transmitters may be used. Both transmitter and receiver are mounted so as to prevent as much as possible of the vibration of the airplane from being communicated to the radio equipment. The use of wind-driven generators conserves space and virtually insures the aircraft transmitter against power failure while the ship is in flight. Storm warnings are given to aircraft by wireless telegraphy, weather maps may be transmitted to them by radio facsimile and they are enabled to keep rigidly to a predetermined course by means of radio 'beacons.' These last, developed in 1927 by the U. S. Bureau of Standards laboratories, consist of special radio transmitters, usually located at main airports. Each beacon transmitter radiates simultaneously two highly concentrated continuous wave beam signals directed at an acute angle with each other. When an airplane flies along the line exactly equidistant from the two beams of radio waves, it receives signals of equal intensity from the two. If the airplane leaves this line it receives a stronger signal from one than from the other.

Wireless Telegraphy on Short Waves.—Hertz's original experiments in radio communication were carried on by means of very short (quasi-optical) waves. Those who carried on his work, however, found that many (to them) inexplicable phenomena attended the propagation of this type of wave and did not affect the longer radio waves to any noticeable extent. They therefore assumed that the longest radio waves—from 500 to 30,000 meters—were the only ones suitable for long distance wireless communication—that the medium length radio waves—from 200 to 5000 meters—were useful for communication over limited distances (for ship sets, say); and that waves below 200 meters in length were virtually useless. Developments from 1920 to 1930 conclusively showed these early assumptions to be completely false: the shorter waves were found to be not only useful but far superior to long waves in all respects. Communication is frequently established by means of short

waves using less than 1.0 per cent. of the power required for a comparable performance with long waves. Furthermore, beam transmission of long wave signals is impossible, while practically all short wave transmitters are now designed to concentrate their radiated energy in a sharp beam, with a consequent great gain in efficiency. In addition to these points, approximately 4000 high-power short-wave transmitters may be operated simultaneously in the same geographical region without interference, as against 100 long wave transmitters, and short-wave transmitters may be keyed much faster and thus can handle far more traffic per unit time than long-wave transmitters.

Central Offices.—One of the very interesting developments of radio is the extensive use of landwires in connection with the service. At first, wireless traffic was handled directly from the transmitting station, with the operator in the actual building housing the transmitter. And the reception was likewise very often in the same building, handled alternately with the transmission, as the receivers were otherwise paralyzed by the powerful local transmission. The growing need for duplex operation led to the installation of the transmitter in a building remote from the receivers; the operators were housed in the receiving building and the transmitters were handled by distant control over land wires. This is still done for the land stations communicating with ships at sea, where it is very necessary to establish intimate contact between the operators on the ships and those on land.

In the long-distance trans-oceanic radio services, a constant stream of messages is going each way and on many circuits to a single foreign radio centre. To reduce the number of points where manual handling of the messages is necessary, the operators have all been brought in to the centres of business, so that in the bulk of instances they transmit directly from the messages as handed in by the users of the service. They control the transmitters as much as two hundred miles away, in a flat open stretch of land near the shore, where the antennae are able to start the radio waves out under the most favorable conditions. The radio signals are received on antennae preferably in a remote spot away from man-made static. There the receiving engineer tunes in the signal to a maximum, adjusts the tone of the audio note to the proper pitch and then sends the signal over the telephone line to the central office. At the central office, the signal is filtered to remove any extraneous land-line

noises, and then it is amplified to give a most powerful signal in the telephones of the receiving operator.

Consult Bucher's *Vacuum Tubes in Wireless Communication*; Eccles' *Wireless Telegraphy and Telephony*; Fleming's *Principles of Electric Wave Telegraphy*; Pierce's *Principles of Wireless Telegraphy*; Turner's *Wireless Telegraphy & Telephony*; U. S. Signal Corps, *Radio Pamphlet No. 40*; Nilson and Horung, *Radio Operating* (1940).

Wireless Telephony, the transmission of sound by electrical means without connecting wires between the source of such sound and the points of audition. Like wireless telegraphy, wireless telephony has been practically accomplished only by the use of radiated electromagnetic waves, and so is better known as radio-telephony. Research in the field of wave-

two additional waves, of frequencies equal respectively to the sum and the difference of the two original waves. Each side band contains the complete characteristics of the voice wave, which may be reobtained by subtracting (by heterodyning or beating) a frequency equal to F from the band frequencies. It is thus necessary to transmit only a single side band of the modulated current and a considerable amount of power may by this means be saved at the transmitter, since the amplitude of the carrier current is at least equal to one-half that of the total modulated current. Also, a far smaller range of wave-lengths or 'channel' is required for transmission, and this increases correspondingly the number of stations which may operate simultaneously.

The suppression of the carrier wave is usually accomplished by means of a balanced

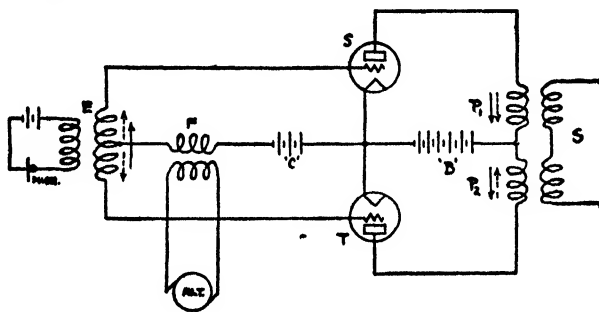


Fig. 1. *Balanced Modulator.*

mechanics had suggested as early as 1890 to numerous physicists the possibility of modulating an alternating current of very high frequency with other currents of frequencies in the audible range, and in 1900, with the advent of successful high-frequency generators, Poulsen and Fessenden began experiments in the modulations of continuous radio waves with the human voice.

The most practical method of modulation for radio telephony is by means of vacuum tube modulation circuits, and since vacuum-tube oscillators and amplifiers are now used throughout in radio telephone transmitters, this method has supplanted all others.

Single Side Band Transmission.—Modulation consists essentially in adding a high frequency alternating current and one or more low frequency alternating currents together in the same circuit. It has been demonstrated mathematically and experimentally that each such addition of a low-frequency wave to one of high-frequency results in the production of

modulator circuit similar to that shown in figure 1. In this circuit the carrier current is produced by generator H and impressed on the grids of the matched triodes T and S through a transformer F connected in the return branch between the midpoint of the input transformer E and the filaments. At the same time the modulating wave produced by microphone D is fed differentially to the grids through transformer E. Thus while the carrier current, flowing as indicated by the dotted arrows, is balanced out in the primary windings P_1 and P_2 of the output transformer, the side bands, produced by heterodyning in the secondary winding of E, flow as indicated by the solid arrows, adding in windings P_1 and P_2 and so appearing in the secondary winding S. One of the two side bands may then be suppressed by a suitable electric wave filter, leaving only a single side band. The balanced modulator was developed by Colpitts in 1919.

Radio Telephone Reception.—For the reception of a complete modulated wave cor-

sisting of a carrier wave and two side bands, a simple rectifying detector (such as a crystal) may be used. When single-side-band transmission is used, a more elaborate receiver circuit is necessary. The usual practice is to make use of the heterodyne receiver with the local oscillating circuit tuned approximately to the carrier frequency of the incoming signal. By regenerative or feed-back action the received signal will then pull the local frequency into step with itself.

Broadcasting.—Broadcasting as an idea for stimulating public interest in radio telephony was conceived by a group of engineers of the Westinghouse Electric and Manufacturing Company, who undertook in 1920 the construction in Pittsburgh of KDKA, the pioneer broadcasting station. On November 2, 1920, this station transmitted the world's first broadcast program. Public acceptance of broadcasting was almost immediate, and in the two years following the opening of station KDKA perhaps a dozen other broadcasting stations went into operation.

Chain broadcasting, or the linking together of numerous broadcasting transmitters by telephone lines, enabling them all to broadcast the same program simultaneously, has been an important factor in broadcast development.

Wire Rope, a cord resembling hempen rope in appearance, but constructed from twisted strands of wire. Its uses include nearly all of those for which fibre ropes are available; and the material, while usually iron or steel, may also be copper or other metal. Wire rope was first used in 1821 by German engineers in constructing the Geneva Suspension Bridge. In 1834 it was adopted in the Hartz mines; but the expense of production precluded its general use. In 1838, however, a machine was invented by R. S. Newall of Dundee which rendered the manufacture of wire rope simple and inexpensive. The principle of this and later machines is that of a revolving wheel, having connected with its outer rim reels on which the strands are wound. The outer ends of the strands are firmly fastened at a point in line with the axle of the wheel, the revolution of which thus twists or lays them into the required rope.

The older type has the separate wires twisted or laid toward the left to form strands, the latter being in turn laid toward the right. It is admirable for hauling in free suspension, where flexibility, strength, and freedom from twisting are necessary. For most purposes, however, it is being superseded by *lang-laid* rope, in which both wires and strands are laid in the same direction. This rope, by presenting a

uniform bearing surface, equalizes strain and wear, and has increased flexibility. It is used for hauling, especially in mine shafts and where grips are applied on endless lines. A still later development is the flat surface rope, in which the outer layer of strands is so shaped as to interlock and form a continuous surface. The number of wires composing a strand varies regularly between seven and nineteen, choice being determined by the greater strength of large wires, and the flexibility of a large number of wires. The usual number of strands is six; but this also varies.

The efficiency of wire rope is much increased by protective coverings such as paraffin, crude petroleum, lead, or steel taping, and by oiling. For copper ropes used as electrical conductors, insulating wrappings are required.

Wireworms are the larvæ of click beetles or skipjacks, so named on account of the shape of the body and the toughness and hardness of the skin. These larvæ are among the most injurious of farm pests. They are yellowish in color, from $\frac{1}{4}$ inch to $\frac{1}{2}$ inch in length, with three pairs of legs, and a suctorial appendage below the tail. The name wireworm is also given to the destructive millepedes found in gardens, especially to species of *Iulus*.

Wisconsin (popularly called the 'Badger State'), one of the North Central group of the United States. It is bounded on the n. by Lake Superior and the Upper Peninsula of Michigan; on the e. by Lake Michigan; on the s. by Illinois; and on the w. by Iowa and Minnesota. The Menominee and Montreal Rivers mark part of the northeastern boundary, and the Mississippi, St. Croix, and St. Louis form nearly the whole of the western boundary. Included in the State are the Apostle Islands in Lake Superior, and a group of islands at the entrance to Green Bay. The total area is 56,066 sq. m., of which 810 are water surface.

Wisconsin lies in the northern part of the Great Central Plain. Its surface is even or gently rolling. In the northern part is the region of highest elevation, a line of low-lying hills called the Penokee Range, which reach an elevation of about 1,700 ft. Most of the State lies in the Mississippi drainage basin. Flowing into the Mississippi River are the St. Croix, Chippewa, Black, and Wisconsin. There is drainage from the northern coastal plain into Lake Superior. Several important streams flow into Lake Michigan.

The mineral resources of Wisconsin are not extensive, the State ranking thirty-first among the States in the value of its mineral products. It ranks first among the States in

the production of fuel briquets and in silica quartz and fourth in quantity and value of iron ore and in quantity of pyrite. The leading mineral industry of the State is stone quarrying. The northern part of the State was originally covered with coniferous forest, consisting mainly of white pine. Both the white pine and the hard woods have been heavily drawn upon. Nevertheless, white pine still constitutes the most valuable timber resource, and Wisconsin is the chief source for its supply. The estimated stand of timber is about 2,000,000 M board ft.

The fishery products of the State are obtained from the Mississippi and its tributaries, and from Lake Michigan. The chief kinds of fish caught are trout, lake herring, buffalo fish, yellow perch and German carp.

According to the Federal Census of 1930, there were 181,767 farms in the State, comprising an area of 21,874,155 acres. The value of farm property, including land, buildings, implements and machinery, was \$1,901,795,675—a decrease of \$453,175,207, or 23.8 per cent., since 1920. White farmers numbered 181,451; Negroes, 316. The principal crops are: hay and forage; corn; white potatoes; oats; barley; tobacco; peas; wheat; rye. Livestock and livestock products furnished about 86 per cent. of the farm income. Nearly all of Wisconsin's grains are fed to livestock. By far the major portion of Wisconsin's farm income is from the dairy industry. The leading industry in Wisconsin is manufacturing and the leading manufacturing industry in value of products is butter, cheese, and evaporated and condensed milk. Foundry and machine shop products, formerly the State's second ranking industry, has fallen below motor vehicles in importance.

Lake Michigan, Lake Superior, and the Mississippi and Fox Rivers, together with the numerous railroads of the State, afford excellent transportation facilities, and give communication with all parts of the United States and Canada. Milwaukee is the principal port of entry. According to the Federal Census of 1950, the total population of the state was 3,434,575. This showed an increase of 296,988 people in the ten years since the 1940 census. The urban population of the state was 55.5 per cent in 1950; an increase of 2 per cent over 1940 figures. The cities with the largest population are: Milwaukee, Racine, Madison, Kenosha, Oshkosh, La Crosse, Sheboygan, Green Bay, and Superior.

Institutions for higher education include the University of Wisconsin, at Madison; Lawrence University, at Appleton; Beloit College, at Beloit; Ripon College, at Ripon; North-

western College, at Watertown; Marquette University, at Milwaukee; Carroll College, at Waukesha; Milton College, at Milton; Milwaukee-Downer College, at Milwaukee; Mission House, at Plymouth; St. Mary's College, at Prairie du Chien; and Northland College, at Ashland. The State also maintains the Wisconsin School of Mines, at Platteville.

The chief executive officers are the Governor, Lieutenant-Governor, Secretary of State and Superintendent of Public Instruction. The governor appoints, with the approval of the Senate, 22 major administrative heads. The legislative body consists of a Senate elected for four years, and an Assembly elected biennially. The number of assemblymen is 100; and the number of senators not less than one-fourth nor more than one-third of the assemblymen. Under the Reapportionment Act Wisconsin has 10 Representatives in the National Congress. Madison is the State capital.

Early explorations in the present State of Wisconsin were made by the French from the Canadian settlements. In 1634, Champlain, then lieutenant-governor of Quebec, sent Jean Nicolet, who made a journey by water to the lakes and rivers of Eastern Wisconsin. Joliet, Marquette, Du Luth, Hennepin, and La Salle all made explorations of considerable extent either around the Great Lakes or in the region of the Mississippi. The United States Government took formal possession about 1816. The period immediately following witnessed a slow development, mostly along the line of fur trading, and was marked by conflicts with the Indians. In 1804 the Sacs and Foxes had made a cession to the United States of their lands e. of the Mississippi. Dispute of ownership followed, which resulted in the Black Hawk War of 1832. The first governmental organization of the Territory was provided by the Ordinance of 1787, which made it part of the Northwest Territory. When this was divided, in 1800, Wisconsin was included in Indiana Territory. In 1805 it was incorporated with Michigan Territory; from 1809 to 1818 it formed part of Illinois territory; and from 1818 to 1836 was again part of Michigan.

In 1836 Wisconsin Territory was organized. It included the present State, and also Minnesota, Iowa, and a portion of the Dakotas. This area was reduced by the organization of Iowa Territory in 1838. On May 29, 1848, Wisconsin became a State of the United States, with its present limits.

Consult Brown's *Scenic and Historic Wisconsin* (1927); Gregory's *West Central Wisconsin* (4 vols. 1933); W.P.A. Writers' Project, *Wisconsin* (1941).

Wisconsin River rises on the boundary between Michigan and Wisconsin, flows s.w. to Portage (300 m.), and thence w. to its junction with the Mississippi near Prairie du Chien. The chief tributaries are the Tomahawk, Big Eau Plaine, Yellow, Kickapoo, Pelican, Prairie, and Eau Claire Rivers. The river is 429 m. long, and its drainage area comprises 12,280 sq. m., almost entirely in Wisconsin. It is navigable to Portage.

Wisdom, Book of. See **Ecclesiasticus.**

Wise, Stephen Samuel (1872-1949), Am. Jewish clergyman, was born in Budapest. He studied at the College of the City of New York and Columbia University. He was pastor of the Congregation of the Madison Avenue Synagogue, New York City, from 1893 to 1900 and of the Congregation Beth Israel, Portland, Ore., from 1900 to 1906. In 1907 he founded and became rabbi of the Free Synagogue of New York. He also founded the Eastern Council of Liberal Rabbis. After 1898, when he became one of the founders of the Federation of American Zionists, Dr. Wise was actively associated with the Zionist movement, attending the Paris Peace Conference as its American Representative. In 1922 he founded the Jewish Institute of Religion, a school training Jewish men for the ministry. He has been active in peace movements, as a trustee of the National Child Labor Committee, in Near East Relief, and on the New York City Affairs Committee. With the rise of anti-Semitism in Germany under the National Socialist government, Rabbi Wise became a leader in the world movement of opposition to the Nazis.

Wistaria, a genus of hardy, climbing shrubs belonging to the order Leguminosae. They thrive in rich, well-drained soil, reaching a length of over 30 ft., and make excellent wall or trellis plants. The species most commonly grown is *W. chinensis*, the Chinese kidney bean tree. There are several species growing wild in the United States in low ground, and about swamps, from Virginia southward to Florida.

Wister, Owen (1860-1938), American author, born in Philadelphia, a grandson of Fanny Kemble. He was admitted to the bar in Philadelphia (1889). After 1891 he devoted himself to literature, frequently visiting Arizona and Wyoming in search of material. His books include: *Ulysses S. Grant, a Biography* (1900); *The Virginian* (1902); *Philosophy Four* (1903); *Lady Baltimore* (1906); *The Seven Ages of Washington* (1907); *Members of the Family* (1911); *The Pentecost of Calcutty* (1915); *Neighbors Henceforth* (1922); *When West was West* (1928); *Roosevelt—The Story of a Friendship* (1930). As collaborator, he work-

ed upon the *Musk-Ox, Bison, Sheep, and Goat* in Whitney's *American Sportsmen's Library* (1904).

Wit, the quick perception and apt expression of resemblance between two objects or ideas ordinarily far apart. Wit differs in its disregard of feeling from humor, which by a double process perceives the comic and sympathizes with its source. Wit is swift, sudden, often destructive. Humor may be slow, quiet, and pervasive, and is always constructive.

Witchcraft. In their original sense, the words 'witch' and 'wizard' denoted the possessors of knowledge, or wise people. Much of the witchcraft of Europe was derived from the science of the Magi, or the magicians of ancient Chaldaea and Persia. In early usage, a witch was one who dispensed spells and charms, and was in league with evil spirits. By a sorcerer was meant a much less powerful personage, somewhat corresponding to the earlier idea of a witch. Although sectarian rancor, private hatred, and political strife were frequently the motives back of accusations of witchcraft, the belief in it, between the 15th and 17th centuries, was deeply rooted and almost universal. Witchcraft was made a felony in England by Henry VIII. and by Elizabeth.



James Wolfe.

(In the National Portrait Gallery, London.)

The history of Europe teems with accounts of the trials, and in most cases the conviction and execution, of persons accused of witchcraft. Between 1450 and 1650 the 'witch mania' is estimated to have cost 100,000 lives in Germany alone. The Puritan settlers of New Eng-

land evinced the same relentless spirit as the Old World sects; and the same horrors marked the witchcraft delusion when it reached its height at Salem, Mass. (1692), where a score of persons were put to death.

Witch-hazel, a term applied to certain shrubs and small trees, one of which is a native of America, the others natives of Japan. The American species (*Hamamelis virginica*) blooms late in autumn, among the fruit of the previous year, and covers the bare twigs with clusters of yellow flowers with thread-like petals. There is a popular belief that its twigs are useful to indicate springs. From the bark and leaves an astringent principle is obtained, which is much employed in medicine.

Witenagemôt, or **Witan**, the Anglo-Saxon great council, composed of the wise-men, the bishops, the ealdormen of the shires, and the king's friends. This body took part in legislation; its consent was necessary to royal grants of land; it exercised judicial powers as a court in the last resort; it gave its consent to taxation imposed by the king; its advice was asked on all questions concerning peace and war, the army, and the fleet. See PARLIAMENT.

Wittenberg, town, province of Saxony, Prussia, on the Elbe. It was the 'Cradle of the Reformation.' Luther was a professor in the University. The castle church (restored in 1892) contains the tombs of Luther, Melancthon, Frederick the Wise, and John the Steadfast. On its old doors (now replaced) Luther, in 1517, nailed his ninety-five theses against indulgences; his house is still preserved; the spot (outside the Elster Gate) where he burned the papal bull is pointed out.

Wodehouse, Pelham Grenville (1881-), English humorist. His popularity was unfavorably affected by his pro-Nazi activities in 1940-42. He wrote the *Psmith* series, the *Jeeves* series, and the *Mr. Mulliner* stories. *Leave it to Psmith* was dramatized in 1930.

Woden, Anglo-Saxon god, was known in Scandinavia as Odin, in Germany as Wodan; his wife was Frigga and his sons, Thor and Balder. He ruled over the wind, and also was the ruler of the world. Woden's Day became our Wednesday.

Woffington, Peg (Margaret) (?1714-1760) English actress, when ten years old played Polly Peachum in *The Beggar's Opera*; in 1740 she appeared in *The Constant Couple*. She became the most popular actress

of her time. See Charles Reade's novel *Peg Woffington*.

Wolcott, Oliver (1760-1833), American public official. In 1789-91 he was auditor of the U. S. Treasury, and in 1791-5 controller of public accounts. In 1795-1800, as the successor of Alexander Hamilton, he was Secretary of the Treasury in the Cabinets of Presidents Washington and Adams.

Wolcott, Roger (1679-1767), American colonial governor, was born in Windsor, Conn. He was second in command of the expedition which captured Louisburg in 1745.

Wolf (*Canis lupus*), the largest living member of the family Canidae, with the exception of some domesticated dogs. The common wolf (known in America as the gray or timber or mountain wolf, to distinguish it from the prairie wolf or coyote) is found over a great part of the Northern Hemisphere. The wolf has long legs, a lank body, erect ears, and a bushy tail, which hangs downward between the haunches and is not curled up toward the tip. Wolves are usually nocturnal in their habits, spending the day in the den, which may be a cave, a hollow tree, or even a burrow, and are for much of the year solitary or found in pairs; but at certain seasons, especially in winter, they live together in packs, and combine to bring down their prey.

Wolfe, James (1727-59), British soldier, born at Westerham, Kent. In 1758 he was given command of a brigade in the expedition against Louisburg, and played the leading part in the capture of the fortress. In December he was selected to command the projected expedition against Quebec. With a force of about 9,000 men he was expected to capture a city occupying an exceptionally strong natural position, carefully fortified, and defended by more than 100 cannon and by about sixteen thousand French and Indians. For two months and a half every effort to make an impression on the place failed; the British forces were reduced by fighting and by disease; Wolfe himself suffered greatly from fever; and the officers were in despair. As a last resort Wolfe, on the 10th of September, decided to land his army in the night-time at the foot of a cliff a mile and a half above Quebec, have his soldiers climb to the heights above, and force the French to fight a pitched battle. The very audacity of the plan gave it success, for the place was insufficiently guarded, and on the night of the 12-13th of September the movement was carried out. Next morning the

French discovered, to their astonishment, that the English were masters of the Heights of Abraham, and Montcalm, the French commander, decided to give battle. The conflict began about 10 A.M., and after a hard-fought contest, in which both Wolfe and Montcalm were mortally wounded, the English were victorious. Quebec surrendered eight days afterwards, and the long contest for supremacy in North America was decided. See Parkman's *Montcalm and Wolfe* (1885).

Woll, Matthew (1880-), American labor leader, born in Luxembourg. First vice-president of the American Federation of Labor.

Wolseley, Garnet Joseph Wolseley, Viscount (1833-1913), British field-marshal. In India (1857-9), during the Mutiny, he shared in the siege and capture of Lucknow. In S. Africa Wolseley completed the subjugation of the Zulus, subdued the disaffected Boers, and completed the annexation of the Transvaal. Lord Wolseley's last active undertaking was the gallant but unavailing effort to relieve General Gordon at Khartum (1884-5). For this he was created (1885) Viscount Wolseley.

Wolsey, Thomas (1471-1530), English cardinal, was born at Ipswich. Henry VII. employed him on several diplomatic missions, and made him dean of Lincoln. On Henry VIII.'s accession, Wolsey was appointed a member of the king's council in 1511. He was made (1514) bishop of Lincoln, and a little later archbishop of York. His rapid rise was due to his skill in diplomacy and foreign policy. In 1515 Wolsey was created cardinal-legate by Pope Leo X.

Wolsey showed his zeal for reform and for learning by his foundation of Cardinal (afterward Christ Church) College, Oxford. His further designs were checked, however, by the divorce question. Henry wished to divorce Catherine of Aragon, and Wolsey endeavored to induce the papacy to declare the King's marriage invalid; but he failed (1520). His enemies, reinforced by Anne Boleyn, had been long waiting their opportunity. Found guilty by Parliament of charges brought against him, he nevertheless obtained his pardon, and was allowed to retain the see of York. On a charge of high treason, he was arrested. On the way to London to meet his trial he died at Leicester Abbey, with the well-known words on his lips, 'Had I but served God as diligently as I have served the King, He would not have given me over in my gray hairs.' See HENRY VIII.

Wolverhampton, city, Staffordshire, England; a great centre of the iron industry; the manufacture of motor cars and cycles, elec-

trical machinery and tin ware are important industries. Coal and iron are mined; p. 133,190.

Wolverine, known also as *Carcajou*, a large fur-bearing animal of the family *Mustelidae*, found in Canada, the northern Rocky Mountains, and northward towards the Arctic circle. It is like the bear in form, small (often not 40 inches long), of blackish-brown color.

Wolverine State, a popular name for Michigan.

Woman's Christian Temperance Union, an organization of women for the protection of the home and the abolition of the liquor traffic, was formed in Cleveland, O., in 1874 by a convention of women from sixteen States, and incorporated in 1883. It was organized in every State, Territory, and dependency of the United States, and was a leading factor in the movement for prohibition.

Woman's Relief Corps, a patriotic and charitable association of women organized in Denver, Col., in 1883, by the female relatives of the U. S. soldiers of the Civil War, the only recognized auxiliary of the Grand Army.

Woman Suffrage. See *Suffrage*, *Woman*.

Womb. See *Uterus*.

Wombat (*Phascolomys*), a genus of herbivorous marsupials, with three living species, all confined to Australia and Tasmania. The largest species measure thirty inches from the tip of the snout to the root of the tail; and all have massive, clumsy bodies and short, thick legs. The toes are furnished with powerful claws, by means of which the animals are capable of excavating burrows.

Women. Fundamentally, the question of the position of women is a biological question. The greater energy of the male among most species, and the structural characteristics which render maternity so much more serious a function than paternity, constitute the most decisive factor in determining the position of women. The consideration that maternity by no means involves the whole life of a woman, and the further consideration that not all women are or need be child bearers, limit but do not change the decisive nature of this factor. A further biological fact of the first importance is the nature of hereditary transmission. The non-sexual characters and aptitudes of both parents are equally liable to be transmitted to the children of either sex, however modified their subsequent development may be by the presence of the sexual characters. If, therefore, one sex reveals many defective and incapacitating qualities, it is necessary to admit the possibility of their

presence also in the other sex, which may equally inherit them; while, if one sex displays a marked superiority, that superiority is necessarily also transmissible to the other sex. From the biological standpoint, therefore, we must rule out of court any extreme statement regarding the position of women: men and women are alike members of the same species, and must stand or fall together.



Thomas Wolsey.

(The portrait by Holbein in
Christ Church, Oxford.)

See MARRIAGE; CO-EDUCATION; EDUCATION IN THE UNITED STATES; HUSBAND AND WIFE; SUFFRAGE, WOMAN.

Women, Councils of, national and international organizations of women working for the general welfare of the home, the community, and the nation.

The *National Council of Women of the United States* was formed in 1888, having for its aims the overthrow of all forms of ignorance and injustice, and the application of the Golden Rule to society, custom, and law. Public meetings are held triennially. Among the questions in which the Council has interested itself are the care of delinquent and defective children and international peace. In 1935, it included more than 5,000,000 women through its affiliated organizations.

The *International Council of Women* is a federation of the various national councils or unions of women, providing a means of communication and of common action between women's organizations in all countries, and offering opportunities for women to meet together from all parts of the world to confer upon questions relating to the welfare of the

commonwealth, the family and the individual. Quinquennial congresses are held.

Women in Industry. Prior to the Industrial Revolution, women in industry were for the most part confined to the textile industries, the clothing and sewing trades, domestic service, the manufacture of food and kindred products, and agricultural pursuits; and their industrial activities were carried on almost wholly at home, often supplementing the usual household duties. With the epoch-making inventions of the late 18th century and early 19th century, and the introduction of the factory system, conditions were radically altered. Not only were large numbers of women transferred from the home to the factory, but the keen competition caused by the multiplication of machine processes and the subdivision of labor opened to them many new pursuits. Labor troubles, scarcity of male labor, periods of financial depression and of war have also operated to favor the employment of women, until to-day they are an economic factor of the first importance.

Women's Bureau, Federal, of the United States Department of Labor, was inaugurated as the Woman in Industry Service in July, 1918, as a temporary war service. In 1920 it was made into a permanent bureau under its present name. It is managed by a woman director. Since its foundation the Bureau has conducted a great number of investigations into the lives and labors of women and girls, in factories, stores, offices and laundries; the work trend of married and single women, labor conditions and wages of Negro women and immigrant women. It has rendered important services to the new Federal recovery agencies under the New Deal, especially to the NRA in formulation of codes, etc.

Women's Clubs. The general women's club movement may be said to date from 1868 with the founding, almost simultaneously, of Sorosis in New York City and the New England Woman's Club in Boston. The development has been along two main lines: the one for the educational and social advantages of the members, such as the various types of study clubs; the other for works of philanthropy, civic betterment, and the promotion of laws benefiting women and children.

The *General Federation of Women's Clubs* is designed to form a common meeting ground for the various groups of clubwomen throughout the United States, that there may be promoted 'a higher type of citizenship, a better public spirit, and a more alert social consciousness.' Its membership includes individual clubs and local and State federations, with a

total membership in 1947 of 2,000,000. Affiliated with the General Federation are a number of other organizations, as well as clubs in other countries; overall mem. 1953, 11,000,000. Meetings are held biennially. Permanent hdq.: 1734 N St., N.W., Washington, D.C. The official publ. is *The Clubwoman*.

Wood, in popular language, is practically synonymous with *timber*; botanically, the term is used interchangeably with *xylem*. Only stems and large branches furnish wood, in the popular sense; technically, the wood is continuous, extending into the twigs and leaves. The constituents of wood are to be found in the fibro-vascular bundles that form, so to speak, the circulatory system of the plant, whether in a fern or a forest tree. These bundles convey the water, laden with earthy salts, and absorbed by the roots, to the leaves. The essential tissue of the xylem consists of wood vessels (technically *vasa* or *tracheae*), arising from the fusion of a longitudinal row of cells, and tracheids, developed from a single cell. In both cases the cell protoplasm has disappeared, and the walls have become thickened by the deposition of lignin, to which substance the hardness of wood is due. There is a marked difference between the wood formed in the spring and that of the autumn growth. In the former the walls of the vessels are thin, and consequently the passage is large; in the latter the lignification of the walls diminishes the size of the passage. The autumn wood, with its closer grain, bounds the rings of any given year. These annual rings are used to ascertain the age of a stem.

Till a tree attains maturity, the annual rings increase in breadth; there is then a stationary period, followed by a decline in the quantity of woody material laid down. Rarely, however, is the breadth of a given ring uniform, especially when trees are crowded together. See **FORESTRY**; **LUMBERING**; **TREE**.

Wood, Francis Carter (1869-1951), American pathologist, was born in Columbus, O. He was professor of clinical pathology (1904-12) at the College of Physicians and Surgeons, Columbia University, and pathologist at St. Luke's Hospital, New York. In 1912 he was appointed director of cancer research of the Crocker Research Fund.

Wood, Grant (1892-1942), American artist, was born in Iowa. His *American Gothic*, displayed in the Chicago Art Institute (1930), won national praise; another famous work is *Daughters of the American Revolution*.

Wood, Henry Alexander Wise (1866-1939), Amer. inventor and engineer, son of Fernando Wood, was born in New York City. He is said to have taken out more patents on printing machinery than any other inventor. He was a member of the U. S. Naval Consulting Board, 1915.

Wood, Sir Kingsley (1881-1943), English statesman, was Postmaster General (1931-35); Minister of Health (1935-38); Secretary of State for Air (1938-40); Lord Privy Seal (1940); Chancellor of the Exchequer (1940-43).

Wood, Leonard (1860-1927), American soldier and administrator, was born in Winchester, N. H. In 1891 he became a surgeon in the army. With Theodore Roosevelt he recruited the First U. S. Volunteer Cavalry (popularly known as the 'Rough Riders') for service in the Spanish-American War, and became colonel of this regiment in May, 1898. He took a conspicuous part in the Santiago campaign; was promoted to the rank of major general of volunteers in December, 1898; and served as military governor of Santiago (1898-9) and of Cuba (1899-1902). At Santiago and Havana he showed himself an efficient administrator, performing valuable service in ridding both cities of yellow fever. From 1903 to 1906 General Wood was military governor of Moro province, Philippine Islands, and from 1906 to 1908 commanded the military division of the Philippines. In 1908 he was transferred to the command of the Department of the East; in 1910 was sent on a special mission to the Argentine Republic; and from 1910 to 1914 was the first chief of staff of the U. S. Army. In 1921 he was appointed Governor-General of the Philippine Islands.

Wood, William (1580-1639), New England colonist, was born in England, and in 1629 went to America. In 1634, while in England, he published *New England's Prospect*, the first printed account of the Massachusetts colony.

Wood Alcohol. See **Methyl Alcohol**.

Woodbine, a popular name in the United States for various species of Virginia creeper and honeysuckle and other climbing vines.

Woodchuck, or **Groundhog**, a North American marmot (see **MARMOTS**), familiar from Hudson Bay southward to South Carolina and westward to Nebraska. It is between 16 and 19 inches long, and a reddish or grayish grizzle in color, varying somewhat with age and season. The woodchuck's manner of life is similar to the gopher: the animal is destructive

to grass and alfalfa crops and garden patches. It burrows deeply in field, hillside, or woods, remaining secluded during the day, and going abroad at night and early morn. On the approach of cold weather it falls into a lethargy in its burrow, hibernating until March or April.

Woodcock, a bird closely related to the snipe, found throughout the warmer parts of the Northern Hemisphere. The coloring is a combination of brown, gray, and buff, with black markings, and there are two transverse buff stripes at the back of the head. The birds frequent marshy woods. The woodcock of the United States, *Philohela minor*, is 11



Woodcock.

inches in length, and is found only e. of the Mississippi and s. of the Canadian forests; it migrates slowly in autumn from the more northern districts to the Southern States.

Wood-Engraving, a form of pictorial art in which the design is in relief. The art of wood engraving is of great antiquity. An old Chinese manuscript dated A.D. 868 bears a woodcut skilfully executed. The oldest European example of woodcut printing extant is dated about 1423. The introduction of paper, and its abundance by the end of the 14th century, assured the widespread use of woodcuts. Sheet prints, with representations of the saints and of incidents in the life of Christ were sold to the pilgrims. Card playing, which became exceedingly popular under Charles VI. of France, also led to the development of wood-cutting. The cards were cut upon wood and colored by the aid of stencils.

About the middle of the 15th century Germany and the Netherlands produced books, known as block-books, in which not only the pictures, but the text, were drawn in reverse and cut upon the wood. After about 1460 Germany produced many books employing woodcut decorations and in France books of the 15th and 16th centuries are remarkable for the excellence of their woodcut illustrations.

The 16th, 17th, 18th and early 19th centuries saw a tremendous growth and improve-

ment in the art of wood engraving, such names as Dürer, Holbein, Cranach, van Leyden, Bewick, and Blake standing out preëminent as masters of the art. After a period in which the use of woodcuts had suffered considerable decline, the late 19th and early 20th centuries saw a decided revival of interest in the art, which has enlisted the interest and attention of many artists. Among modern wood engravers the names of Daglish, Raverat, Paul and John Nash, Sidney Lee, Gribble, Gauguin, Gusman, Lepere, Le Breton and Gibbings stand well to the front.

In a wood engraving the parts to appear white are cut away, and those to be printed are left untouched. For the engraving three kinds of cutting tools are used—gravers, tint tools and scorpers or gouges. When the engraver starts work upon a block he makes with his graver a cut on each side of every drawn line. This stage is called 'outlining,' and the operation is repeated section by section till the whole block is treated; then, if the subject is a line drawing, the scorpers are used to cut away the parts which should appear white on the print. This done, the block is ready for proving. To prove a block, the ink is dabbed lightly and evenly over its surface by a silk 'dabber,' a piece of India paper placed gently upon it, and rubbed firmly with the burnisher over the work. To engrave a wash drawing, the picture is outlined where the outlining is needed, as before; but as each section is outlined, the protecting paper is replaced over it. When the outlining is completed, the block is again gone over section by section, this time with the tint tool; and it is his manipulation of the tint tool which brings out the best skill of the engraver. By it he must so line the block that flat washes will appear when printed as they do on his copy, and not as simply a number of lines; by it, too, he gives the texture of sky, clouds, foliage, grass, sea, or whatever else his subject requires. When all is done, the whites are removed with the scorper, and the block is proved as in the case of line drawing.

In the latter part of the 19th century the photographer, by means of the half-tone process, to a great measure supplanted the work of wood engravers but recent years have shown a decided tendency toward the revival of the use of woodcuts and improvement in the technical processes have served to bring the art back to its former prestige. See Bliss' *Wood Engraving* (1928); Doust, *Wood Engraving* (1934).

Woodford, Stewart Lyndon (1835-1913), American lawyer, soldier, and diplomat, was born in New York City. In 1861-2 he was assistant district attorney of the Southern Dis-

trict of New York. After the Civil War he was lieutenant-governor of New York (1866-8), U. S. attorney for the Southern District of New York (1877-83), and in 1896 a member of the commission by which the Greater New York charter was drafted. During the critical period between 1897 and the outbreak of the Spanish-American War in 1898, he was U. S. minister to Spain.

Wood-lice (Oniscidae), a group of isopod crustaceans, whose members are adapted for a terrestrial life. The wood-lice inhabit damp places, are usually nocturnal, and are vegetarian in diet. Very common in gardens and hot-houses are the so-called 'slaters.'

Woodin, William Hartman (1868-1934), Secretary of the Treasury by appointment of President Franklin D. Roosevelt, 1933-34. President of the American Car and Foundry Co., 1916-22. In his later years he wrote several light musical compositions, some of which were played in concert.

Woodmen of America, Modern, a fraternal beneficiary association founded in 1883. The order has a membership of about 436,000.

Woodmen of the World, a fraternal beneficiary order founded in 1890. In 1950 it had about 36,790 members.

Wood Oil. See **Gurjun Balsam**.

Woodpecker, a general name for the members of the large family *Picidae*. The head is large, the neck very muscular, and the tongue exceedingly long and worm-like, with a barbed and horny tip. When in search of food the woodpeckers climb trees, clinging closely with the claws and in many cases supported by the very stiff, pointed quills of the tail. With the powerful chisel-like beak, the bird chips off loose bark or digs into the decayed wood in which the eggs or larvæ of insects have been hidden. In the United States and Canada two small black-and-white species, the downy and the hairy, are familiar almost everywhere. Other common species are the 'flicker,' or 'high-hole,' the red-headed, and the yellow-bellied ('sap-sucker').

Wood Pulp, a material largely employed for paper making, and obtained by disintegrating wood. The wood fibres are separated either mechanically or chemically. The first variety is prepared by grinding the wood under water, and is of inferior quality, as the fibres are short and readily discolor. In the superior kinds, prepared by chemical means, the wood is cut up and boiled under pressure with solution of caustic soda, sodium sulphide, or, best of all, calcium bisulphite, and the resulting soft product is pulped, pressed, washed, and bleached.

Woodward, Robert Simpson (1849-1924), American scientist, was born in Rochester, Mich. In 1884-90 he was astronomer, geographer, and director of the department of geography of the U. S. Geological Survey, and was an assistant engineer on the U. S. Coast Survey in 1890-93, when he became professor of mechanics at Columbia. In 1905-20 he was president of the Carnegie Institution, Washington, D. C., and also served on the Naval Consulting Board during the Great War.

Wool, the fleecy covering of sheep, characterized by the waviness and scaly covering of the fibres. It differs from hair in having scales which are more pointed and protruding, thus giving it a greater tendency to mat together. It is also more wavy and has greater elasticity.

Wool is next to cotton the most important fibre employed by man and has been used since prehistoric times. The annual consumption in the United States amounts to between 550,000,000 and 650,000,000 pounds annually on the scoured basis including both carpet and apparel wool. There are no wild animals known which exactly resemble the wool-bearing sheep, hair or fur taking the place of the wool in their supposed progenitors, with a fine, soft hair or wool next the skin. The latter has been developed and the coarse hair largely eliminated in the modern sheep. Breeding, selection, feed, protection, and careful handling have effected great changes in the fineness of wool, its length of staple, and adaptation to various purposes. Sheep are classified either on the length of staple into short-wools, medium-wools, and long-wools or by the quality of wool, as high grade, medium grade or poor grade. Wool is classed under three general heads: (1) the carding or clothing wools, (2) the combing or worsted wools, and (3) miscellaneous or carpet and blanket wools. This classification is based on both the length, fineness, and felting qualities of the staple. The finest wool, such as is produced by the Merinos, is only 1 or 2 inches in length, while that of the Lincolns is 8 inches or over, and in some breeds reaches more than a foot. The fine short-staple wools felt more readily, and are employed for carding and spinning, the scales of the curly filaments interlocking and forming a thread which does not untwist. The longer stapled wools are less wavy and are better suited to combing and making non-felting worsteds and are more lustrous than the carding wools. An average of fleece for all breeds is about 6 lbs., but in the American Merinos it often amounts to 15 to 20 lbs. for rams and 12 to 15 lbs. for ewes. Machine shearing has replaced hand shearing on the larger ranges of the West, and gives a

larger amount of wool, as the shearing is closer. A good shearer can shear from 100 to 200 sheep daily. Alpaca and mohair are not true wools, but are sometimes classed as such for industrial purposes. The former is produced by the alpaca goat, and mohair is the product of the Angora goat, now quite extensively raised in the United States. Cashmere wool comes from the Cashmere goat, found mainly in Tibet, and is very costly, as only the finest fleece is used.

The principal wool producing countries of the world are South America, especially Argentina and Uruguay, Australia, New Zealand, the United States, Great Britain, Soviet Union, Spain, South Africa, India, China and Persia. The wool production of the world has averaged recently 3,835,000 pounds, and that of the United States has averaged for the past few years about 288,000,000 pounds on the raw or grease basis. See also SHEEP; WOOLEN TEXTILES.

Wool, Mineral (also called 'slag wool,' 'rock wool,' 'silicate cotton,' and 'cotton fibre') a kind of slag produced by subjecting molten slag or rock to a jet of steam or air, whereupon, by means of special machinery, fine flakes result, which are broken up into minute particles and felted together. This 'wool' is light, a non-conductor of heat and sound, and vermin-proof and fireproof. It is extensively used as a lining for floors, outside walls, partitions, and roofs, and as a covering for boilers, stovepipes, and water-pipes. It is also used for cleaning purposes.

Woolen Textiles are divided into two main classes, *woolens* and *worsted*s, according to the nature of the fibre employed and the treatment to which it is subjected. In woolen manufacture the raw materials employed consist of (1) Wools, principally the shorter varieties. (2) Noil—the short fibres taken out of wools in the combing operation, the longer fibres being employed for worsted yarns. (3) Re-manufactured materials, principally shoddy or mungo. Shoddy is prepared by tearing up various fabrics or using the waste from wool and worsted manufacture.

If the wool is received in the raw state, it must be scoured—a process usually effected by passing it through three or four machines charged with soap and alkali and rinsing solutions, and finally passing it on to the dryer, which delivers it to the blender. Upon the blender's choice of materials for mixing depends both the quality and the price of the resulting yarn. Having selected his materials, he builds up a stack of these by placing a layer

of one material, then a layer of another material, and so on, each layer being lightly oiled in order to render the fibers more plastic. Wool is fed to the next operation by cutting through sections of the 'sandwich' to assure mixing. Willowing refers to the passing of the blend through a willow or spoked drum machine, while teasing refers in like manner to passing the blend through a finer machine more nearly approaching the card, which mixes the fibers more finely.

The operation of carding consists in thoroughly separating and mixing the individual fibers of which any blend is composed, the result being a uniform film or sliver of wool, from 60 to 80 inches wide and say $\frac{1}{8}$ inch thick, which is broken up in the condenser into sixty or eighty slivers or pith-like filaments, which are eventually spun into threads either on a mule or spinning frame.

The operation of 'mule spinning' is as follows:—First, the condensed sliver, as received from the carder, being too thick for thread, must be drawn out; secondly, to prevent the sliver from breaking, a little twist must be inserted during the drawing out; thirdly, when this is accomplished, the necessary twist must be inserted; and finally, the spun yarn must be wound on to the spindle. The mule which is a most ingenious contrivance, effects all these processes as the carriage recedes or runs out.

Upon receiving the yarn from the spinner, the manufacturer arranges the warp in the loom. The shuttle is arranged to take the spool, upon which the filling yarn is wound by the mule or spinning frame. The year 1889 saw the invention of the 'Nothrop loom,' in which, when a bobbin had become emptied, an automatic motion forced out the empty spool and inserted a full spool, without stopping the loom. This was the first machine of its kind and was an important improvement in textile machinery.

When the woolen fabric leaves the loom, it is usually uncouth, harsh, and unattractive both in appearance or in feel. It must then go through a long series of finishing processes, before it is ready to be dyed. The remarkable advances made in textile chemistry and textile physics have of late years revolutionized the finishing processes. The actual operations in finishing, as applied to dress goods, linings, are many and varied. Among these operations are 'Cravenette,' or other waterproof and spot-proof processes; the mercerizing process, for producing a crepon effect on goods manufactured from cotton and wool; fulling to condense the fabric into a firm texture; moth-

proofing; shrink proofing; the tenting and singeing operations for the well known glacés or alpacas; and the brushing, shearing, pressing operations to obtain the various finishes.

Woolf, Virginia (1882-1941), English novelist, daughter of Sir Leslie Stephen, was among those who used 'stream of consciousness.' Among her works are *Mrs. Dalloway* (1925); *To the Lighthouse* (1927); *Between the Acts* (1941); *A Writer's Diary* (1954).

Woollcott, Alexander (1887-1943), American critic, was born at Phalanx, N. J.; educated at Hamilton College and Columbia University. He was dramatic critic of the *N. Y. Times* (1914-22); *N. Y. Herald* (1922); *N. Y. World* (1925-28). He wrote *White Rome Burns*; *The Woollcott Reader*; *Long, Long Ago*.

Woolley, Mary Emma (1863-1947), American educator. She in 1901 became president at Mt. Holyoke College. She is a member of many educational associations. She was appointed a member of the American Delegation to the Conference for the Reduction and Limitation of Armaments at Geneva, the only woman to receive such an honor. In 1936 she retired from the presidency of Mt. Holyoke College.

Woolman, John (1720-72), Quaker preacher, was born in Northampton, N. J. He began to preach in 1741, and in 1746 visited the communities of Quakers in the frontier districts of Virginia. Most of the remainder of his life was spent in such journeys. His published works include *Journal of John Woolman's Life and Travels* (1775).

Woolsey, Theodore Dwight (1801-89), American scholar and educator, a descendant of Jonathan Edwards, was born in New York City. He was professor of Greek at Yale from 1831 to 1846, and from 1846 to his resignation in 1871 he was president of the institution.

Woolwich, metropolitan borough, administrative co. of London, contains a royal arsenal and dockyard; factories for guns, gun-carriages, torpedoes, and ammunition; barracks and military hospital. It is the headquarters of the Royal Artillery, and seat of the Royal College for Engineering and Artillery.

Woolworth, Frank W. (1852-1919), American merchant, who started in 1879 his first 'five-cent' store, moved to Lancaster, Pa., where he began to expand his business till his chain of stores came before his death to number about 700 of the well-known '5- and 10-cent' stores. He built the skyscraper known by his name in New York City of which Cass Gilbert was architect.

Woonsocket, industrial city, Providence co., Rhode Island, on the Blackstone River. Cotton and woolen goods, rubber goods, wringers, machinery, knit goods, and hosiery are manufactured; p. 50,211.

Woorali. See *Curare*.

Wooster, city, Ohio, county seat of Wayne co., is the seat of the University of Wooster (Presb.) and of the Ohio Agricultural Experiment Station. Brushes, boilers and pumps, aluminum ware, agricultural implements, and furniture are manufactured; p. 14,005.

Worcester, city, Massachusetts, one of the county seats of Worcester co., is situated on the Blackstone River, at an altitude of 475 ft. It occupies an area of 38 sq. m., including several lakes. Worcester was the first city in the United States to purchase land for park purposes. It is the seat of Clark University, Worcester Polytechnic Institute, a State normal school, Worcester Academy, and Holy Cross College. Worcester is one of the leading manufacturing cities of New England. Foundry and machine-shop products are the chief articles produced. The city is said to be the world's greatest centre for the manufacture of wire and wire novelties. The first settlement here, called Quahsigamog Plantations, was established in 1673. The name Worcester was given to the second settlement, which was made in 1684. In 1702 the Indians again rendered the place untenable. The first permanent settlement dates from 1713; p. 203,486.

Worcester, city in Worcestershire, England, on the Severn River. Important buildings are the Cathedral, the Guildhall, Market Hall, the Commandery, founded in the 11th century as a hospital, several ancient churches, St. Oswald's Hospital, and the Royal Porcelain Works; p. 50,497.

Worcester, Edward Somerset, Marquis of (1601-67), was born in London. In his *Century of Inventions*, written in 1655, but first printed in 1663, he deals with 'an admirable and most forcible way to drive up water by fire'—a steam apparatus which could raise a column of water to the height of 40 ft.

Worcester, Joseph Emerson (1784-1865), American lexicographer, was born in Bedford, N. H. He was employed in 1828 to abridge *Webster's Dictionary*, and in 1830 he published his own *Comprehensive Pronouncing and Explanatory Dictionary*. In 1846 appeared his *Universal and Critical Dictionary of the English Language*.

Worcester Polytechnic Institute, a technical school established at Worcester, Mass., in 1865, by John Boynton.

Worde, Wynkyn de (d. 1534), English printer, was born at Wörth in Alsace, and went to England about 1476 as Caxton's assistant. In 1491 he succeeded to Caxton's business. Between 1493 and 1500 he issued at least 110 books. From 1501 till his death he printed more than 600.

Worden, John Lorimer (1818-97), American naval officer, was born in Westchester co., N. Y. He superintended the construction of the famous *Monitor*, and when the vessel was completed was given command of her and sent to Hampton Roads. There, on March 9th, he met and foiled the redoubtable Confederate iron-clad, *Merrimac*, and thereby saved the Union fleet from total destruction. He participated in the bombardment of Charleston, and during 1863-6 was stationed in New York.

Wordsworth, William (1770-1850), English poet, was born in Cockermouth, Cumberland. His childhood and youth were spent among the lakes and hills of the north country. While still a student, he visited France and Switzerland (1790). His first work as a poet, *An Evening Walk and Descriptive Sketches*, was published in 1793, and in 1795, having received a legacy of £900 from his friend Calvert, who had expressed the wish that the young man should make poetry the serious business of his life, Wordsworth, with his sister Dorothy, settled in Racedown, in Dorset. Here they were visited by Coleridge, who had been strongly attracted by Wordsworth's early work, and two years later they moved to Alfoxden in Somersetshire, in order to keep in touch with this new acquaintance. From the conversations of the two young poets came *Lyrical Ballads*, which appeared in 1798 and included 'We are Seven,' 'Lines above Tintern Abbey' and numerous other poems by Wordsworth, and 'The Ancient Mariner' by Coleridge. At Grasmere, also, *The Prelude* was begun. In 1802 he married his early schoolmate, Mary Hutchinson, a union which proved to be unusually tranquil and happy.

In 1807 Wordsworth produced two volumes, containing some of his finest verse—the sonnets on 'Liberty,' the 'Ode to Duty,' and 'Ode on the Intimations of Immortality.' The year 1814 saw his second tour in Scotland and the publication of *The Excursion*. *The White Doe of Rylstone* appeared in 1815, *Peter Bell* in 1819, and then in rapid succession *The Waggoner* (1819), *Sonnets on the River Duddon* (1820), *Memorials of a Tour on the Continent* (1820), and *Ecclesiastical Sketches* (1822). On the death of Southey, Wordsworth was appointed (1843) poet-laureate.

The principal biographies are those by Chris-

topher Wordsworth, F. W. H. Myers ('English Men of Letters' Series), J. M. Sutherland, Elizabeth Wordsworth, Professor Knight, and G. M. Harper (1916). Consult, also, Knight's *English Lake District*, and *Through the Wordsworth Country*.

Work, in mechanics, is the accomplishment of motion against the action of a resistant force, as when a weight is lifted against the force of gravity. It is measured as the product of the resistance overcome and the distance through which it is overcome, or, in other words, the produce of the effective force and the distance through which it acts. Three distinct units are employed. The erg is the C.G.S. unit, the foot-poundal is the scientific unit in the British system, and the foot-pound the engineer's unit in the same system. The work done by a force in foot-pounds is the measure of the effective component of the force in pounds multiplied by the distance in feet through which it acts. Thus, if a body of 100 lbs. weight is raised 6 ft. against gravity, then 6×100 foot-pounds of work are done on it. It has then gained potential energy, and can do, neglecting friction, 600 foot-pounds of work in sinking back to its original position. Work may be expended in straining a body, such as a spring; this stores mechanical energy, which will be given back when required, minus what has been dissipated in friction.

Work, Hubert (1860-1942), American public official, was born in Marion Center, Pa. He received his M.D. from the University of Pennsylvania. He was a delegate at large to the Republican National Convention in 1908, Chairman of the Republican State Central Committee 1912; U. S. Postmaster-General 1922-28; Sec. of the Interior 1923-28.

Workmen's Compensation. See **Employers' Liability; Insurance, Industrial.**

World Bank, The. See **U. S. United Nations Conferences. International Bank.**

World Court, The, or, as it is officially known, the PERMANENT COURT OF INTERNATIONAL JUSTICE, is an international court accessory to the League of Nations, established in accordance with Article 14 of the Covenant of the League. The Court consists of fifteen members—eleven judges and four deputy judges. The seat of the Court is at The Hague, and sessions are held yearly, beginning on June 15. Extraordinary sessions may be held at the call of the President. The Court is open to all nations of the world. Hearings are public unless the Court decides otherwise, or the parties demand exclusion of the public. The official languages are French and English. All questions are decided by a majority of the

judges present at the hearing (nine judges constitute a quorum). Labor cases and cases relating to transit and communications may be heard before special chambers. Where the Court does not include a judge of the nationality of either contesting party, provision is made for the choice of such a judge. Fifty-two states have signed the Protocol establishing the Court, and of them, forty-five had ratified it up to the end of 1934. The Protocols were sent to the U. S. Senate in 1930 and ratification was recommended by the Foreign Affairs Committee on June 1, 1932. In 1935 the Senate rejected the Protocols by a vote of 52 to 36, seven votes less than the required two-thirds majority.

World's Columbian Exposition, an international exposition held in Chicago from May 1 to Oct. 30, 1893, in commemoration of the four hundredth anniversary of the discovery of America by Columbus (1492). A site covering an area of 666 acres was chosen in Jackson Park, on the shore of Lake Michigan. State buildings and special structures erected by foreign governments increased the total number of the larger buildings to more than 150. Scattered throughout the grounds, were groups of sculpture, of which a fountain by MacMonnies, and a colossal statue by French, in the Court of Honor, were the most striking. A series of international congresses were held in Chicago during the Exposition.

World War. See **Europe, World War I.**

World War II started Sept. 1, 1939 with the invasion of Poland by Germany. Two days later England and France declared war on Germany. The Treaty of Versailles (1919) had created Poland from portions of Germany and Russia. To provide the new state with an outlet to the sea, the so-called Polish Corridor, between Germany and East Prussia, was given to Poland. Danzig, the inhabitants of which were nearly all German, was made a free city under the League of Nations, giving Poland the use of a Baltic harbor. In early 1939 Hitler announced his intention of bringing Danzig back into Germany. He also demanded a right-of-way across the Polish Corridor. The Poles refused the demands. Early in August 1939 both England and France declared they would stand by their treaty with Poland and would go to war against any nation invading it. Late in August the world was startled when Germany and Russia signed a mutual non-aggression pact. On Sept. 1 Hitler, addressing the Reichstag, announced that Germany had begun an attack on Poland early that morning.

The Polish Theater. From East Prussia one Nazi force swept down on Grudziadz. In four days it met another army sweeping east across the Corridor, cutting the line of the Warsaw-Gdynia railroad. Also from East Prussia went another mechanized column toward Mlawa and Pultusk. From Breslau an army was launched toward Lodz, Kielce, and Cracow. From Slovakia two spearheads swept north through the Jablonka Pass and over the steep Tatras. Overhead Nazi planes bombed villages, cities, railroads, bridges, highways, and the retreating Polish army. Within 11 days the entire western half of Poland was isolated. The Nazi forces from the south had made contact with their armies from the north and the pocketed Poles were forced to submit. During the fighting Russia had massed a huge army on the Polish border. On Sept. 17 the Reds crossed the frontier. They swept west, meeting little opposition, and in two days met the advancing Nazis. Thereupon Polish resistance ended. A few days later the nation was partitioned, $\frac{2}{3}$ to Russia and the balance to Germany.

The Russian-Finnish Episodes. The war scene then shifted to Finland where on Nov. 30, 1939, Russian armies crossed the borders. The Finns held tightly and bravely but their small army was no match against the countless hordes Russia put into the field. On March 13, 1940, Finland surrendered and yielded valuable territory to her aggressor. Finland re-entered the war June, 1941, joining Germany when the latter attacked Russia. Until December the Finnish army, aided by the Nazis, pushed the Russians back and recovered most of the ground lost the previous year, but by Feb. 1942 was again bending back before the might of Russia.

The Invasion of Scandinavia. On April 9, 1940, Germany invaded Denmark and Norway. The former surrendered without a battle but Norway elected to fight, calling upon England and France for aid. British troops were rushed to the Norwegian front only to find that Germany was in control of almost all available airfields. By May 1 all British troops were evacuated from south Norway but they remained in Narvik, in the far north, until June.

On the Western Front. During the winter of 1939-40 the Franco-German border saw little activity. The French army, backed by the British, were waiting for the expected assault, believing they were secure in their famed Maginot Line, a system of great fortifications, largely underground and many miles

in depth. On May 10, 1940 Germany invaded Luxembourg, Belgium, and Holland. The former offered no opposition, Holland capitulated four days later, and Belgium abandoned the defense on May 27. On June 11 Italy entered the war on the side of the Nazis and began a series of air raids on British and French Mediterranean possessions. The Germans quickly overran France, ignoring the Maginot Line and coming in behind it from the north. Paris fell June 14 and three days later the government, which had fled to Bordeaux, announced that it was unable to continue the fight and sought an armistice. Under its terms the entire French Atlantic coast was placed under Nazi control as well as all of the northern section, including Paris. Many Frenchmen escaped to England where a provisional government, known as Free-French, was set up under Gen. Charles De Gaulle and was recognized by Britain. By July 1 England was battling alone against the Nazi hordes.

The Baltic States. On June 16, 1940 Russia, apparently fearful that an easy victory over the British would cause Germany to turn to the east, occupied Latvia, Lithuania, and Estonia, thereby placing 500,000 Red troops on the East Prussian border. The three nations were forced to become provinces of the Soviet Union.

Russia in the Balkans. On June 28, 1940 Russia again moved, forcing Rumania to yield Bessarabia and northern Bucovina.

Italy in the War. Italy entered the war June 11, 1940 but played no part in the defeat of France. Italian troops in east and north Africa made some advances in the fall of 1940 but British troops regained all lost territory during 1941 and were in complete control in Ethiopia, Eritrea, and Somaliland. Early in 1941 the British drove the northern Italian army out of Libya but were later driven back to the Egyptian border when German troops reinforced the Italians. Late in 1941 the British again conquered nearly all of Libya but on Feb. 5, 1942 were again being chased back to Egypt by German mechanized divisions. In the winter of 1940 Italy attacked Greece from Albanian bases but was losing to the smaller Greek army until the spring of 1941 when Germany came to her aid and attacked Greece from the north. Through Feb. 1942 the Italian army had lost every engagement and the Italian navy had been largely destroyed and was hiding in home ports.

Nazi Conquest of the Balkans. During the

winter of 1940-41 Rumania, Hungary and Bulgaria came voluntarily under complete Nazi domination. Yugoslavia remained aloof. In the spring of 1941 German armies swarmed into Yugoslavia and Greece and both countries, despite some limited British aid, were quickly defeated. Germany then invaded Crete from the air with parachute and airborne troops and drove the British defenders off that island.

On African Soil. During the summer of 1940 Italian troops moved west across Libya and invaded British-protected Egypt. In December the British counterattacked and in 60 days controlled all of eastern Libya. Later in the year German and Italian troops, under German command, drove the British back into Egypt. The English retaliated in Dec. 1941 and by Jan. 15, 1942 again controlled all of Libya. An Axis counterattack, however, again turned the tables and on Feb. 5, 1942 had regained most of the territory. In east Africa the British had completely annihilated Italian resistance and that part of the Italian empire was completely under English domination.

In the Near East. Turkey managed to remain neutral through Feb. 1942 but Iran and Iraq on her east were occupied, after desultory fighting, by British, Russian, and Free French forces in 1941.

The Eastern Front. Despite the non-aggression pact with Russia, Germany again violated the terms of a treaty by invading Russia in June 1941. In five months of the most vicious warfare the world had ever seen the Nazis beat back the Red defenders until they were within sight of Leningrad and Moscow, had conquered all of the Crimea save Sevastopol, and were in Rostov, key to the Caucasus. By Dec. 1 it appeared that the Russians would be driven out of Europe and behind the Urals. Suddenly in early December there was a change. The Red army, which Hitler had declared already beaten beyond hope of recovery two months earlier, launched an offensive along the entire 1,700-mile front. Then, for the first time in the war, the German army began to retreat. In temperatures often as low as -50° F., the poorly clad German troops froze to death by the thousands as they were harassed continuously by Red soldiers, more accustomed to the Russian winter. During the general retreat in late December, Hitler removed his commanding general, von Brauchitsch, and assumed the title of commander-in-chief for himself. By early Feb. 1942 the Russians had regained

about one-fourth of the territory which had been conquered by the Nazis and were still pushing ahead with increased speed.

In the Far East. Since 1937 Japan had been fighting China but by late 1941 still lacked the power necessary to bring that war to a successful conclusion. The United States, Britain, and the Dutch East Indies had placed embargoes on materials to Japan which would eventually cause a shortage of essential war materials, steel, petroleum, etc. It was made clear to Japan that only a cessation of her war on China would bring an end to the embargoes. Japanese politicians dared not end the Chinese war without a victory and in the fall of 1941 engaged in many talks with the United States, England, and the Dutch. During the progress of these talks, on Dec. 7, 1941, without warning, Japanese airplanes and surface vessels attacked Hawaii, the Philippines, other U. S. insular possessions, and Malaya. By virtue of two great victories against the United States and British navies in December, Japan won control of the far Pacific for her navy. By Feb. 5, 1942, she had conquered all of the Philippines, except for Bataan Peninsula on Luzon, and the naval base on Corregidor Island; Hong Kong; all of Malaya except Singapore; many small islands under the control of the Allies; and had made landings on Borneo, Celebes, and many Dutch possessions. She was still winning victories in many places on the far-flung battle front. On the Chinese front, however, the Chinese won substantial victories in December and January but there was an apparent deadlock in the early part of February.

War in the Air. The first 30 months of the war proved that superiority in the air was vital on either sea or land, on defense or offense, although ground troops for occupation of conquered territory were still a vital need. The German army used dive bombers as artillery, in her attacks, softening ground troops for her tank and infantry divisions. Nazi bombing planes were also used to destroy enemy airfields and this tactic, combined with her larger number of planes gave Germany a decided air advantage on every front during the first two years of the war. By Feb. 1, 1942, it was believed that combined Allied plane production equaled the German but on many fronts, notably in the Pacific, there was an obvious shortage of Allied planes. In the summer and fall of 1940 English cities were smashed hard by Nazi bombers, London emerging as the most bombed city in history,

with many of her famous historical landmarks wiped out. It became obvious, however, that no amount of civilian bombing so destroyed morale as to cause an inside break. The Russo-German fighting in 1941 and 1942 brought about a decline of the Nazi bombings of England and ever more often the British airforce struck at vital German cities and war industries.

The War at Sea. Despite heavy losses of major and minor war vessels the British navy maintained control of the seas about Europe for the first 30 months of the war and the entrance of the U. S. Navy into active fighting late in 1941 gave still greater control. During 1940 and early 1941 German submarines were a decided menace in the Atlantic and sinkings by them were at a dangerously high level. In the latter half of 1941 new methods, however, caused submarine sinkings to fall off to a marked degree. In the Pacific the damage done to the U. S. Navy at Pearl Harbor, Hawaii, Dec. 7 and the sinking of the British battleships, *Prince of Wales* and *Repulse*, off Malaya later in the same month, gave Japan naval superiority in the Far East. In late December Japanese submarines sank several vessels within sight of the U. S. Pacific coast and in January and February, 1942, German submarines appeared off the U. S. Atlantic coast, winning some successes. In the meantime, the continent of Europe was tightly blockaded, denying Germany many needed war essentials.

The United States and World War II. At its regular session the 1939 Congress refused to follow Pres. Roosevelt's recommendation that the embargo on sale of munitions to belligerents should be lifted. As soon as the war broke out in September, the President called a special session and, backed by great public sentiment, won this point. This new legislation permitted the sale of munitions to any belligerent, but provided that they must be paid for in advance and shipped in the belligerent's own ships. Practically, this permitted Britain and France full access to U. S. industry but, lacking control of the seas, Germany was unable to purchase materials in the U. S. During 1939, 1940, and 1941 U. S. sentiment was strongly on the Allied side but neutrality prevailed with the president and his leading advisors ardently pro-British. In June, 1940, following the collapse of France, a frightened United States began belatedly to make preparations for defense. As Germany and her partners marched victoriously through Europe, more and more the

people of the U. S. came to the realization that, sooner or later, they would be forced into the conflict. Pres. Roosevelt expressed himself on many occasions as entirely favorable to the British. In the summer of 1940, by clever manipulation of existing laws, he gave England 50 over-age destroyers in exchange for eight 99-year leases for naval and air bases in British territories in the western Atlantic. In the fall of 1940 the first peacetime conscription in the history of the country went into effect and by Feb. 1942 the army numbered more than 2,000,000 men. In 1941 several U. S. vessels were sunk on the high seas by German submarines. As a result U. S. troops and naval forces occupied Iceland and Greenland. In the fall of 1941 two U. S. destroyers were torpedoed, one sinking with a large loss of life. Immediately orders were issued to the navy to shoot first at any Axis boats seen. Meanwhile, China was receiving war equipment from the U. S., while Japan was being strangled economically by an embargo laid against her by the U. S., Britain, and the Dutch East Indies. During this period the U. S. repealed legislation that banned our merchant ships from belligerent waters and forbade them arms. On Dec. 7, 1941, while Japan's emissaries were closeted with Secretary of State Cordell Hull, seeking a solution to her problems, the Japanese navy and airforce bombed Honolulu without warning, causing many deaths, sinking several war vessels, and destroying many fighter planes on the ground. Two hours after the attack Japan declared war on the U. S. and England. The following day Pres. Roosevelt appeared before Congress and war was declared on Japan. Dec. 11 Germany and Italy declared war on the U. S. In the next months the Japanese made conquests of small insular possessions and won the Philippines. In July, 1942, Japanese forces held the three westernmost Aleutian Islands. American troops were soon speeding toward battle fronts all over the world and American industry was rapidly being turned over to the production of war materials. By Jan., 1943, the United States had sent a million men overseas; by Jan. 1944, four million. Nov. 22-25, 1943 President Roosevelt, Prime Minister Churchill, and Generalissimo Chiang Kai-shek conferred at Cairo and declared that Japan must be forced back to her possessions and boundaries of 1895. Nov. 28-Dec. 1 Roosevelt, Churchill, and Stalin met at Teheran to plan the 1944 invasion. For further events see CHRONOLOGY OF WORLD WAR.

Chronology of World War II

1939

- Sept. 1—Germany invaded Poland.
- Sept. 3—England and France declared war on Germany.
- Sept. 17—Russia invaded Poland.
- Sept. 20—Germany and Russia divided Poland.
- Nov. 30—Russia invaded Finland.

1940

- March 12—Russia and Finland made peace pact.
- April 9—Germany invaded Denmark and Norway.
- May 10—Germany invaded Belgium, the Netherlands, and Luxemburg.
- May 14—The Netherlands capitulated.
- May 28—Belgium capitulated.
- June 4—Dunkirk evacuated.
- June 9—Norway capitulated.
- June 10—Italy declared war on England and France.
- June 14—Germany occupied Paris.
- June 15—Russia invaded Lithuania.
- June 16—Russia invaded Latvia and Estonia.
- June 18—Heavy air raids on England started.
- June 22—France and Germany signed armistice.
- June 25—France and Italy signed armistice.
- June 28—Russia occupied parts of Rumania.
- Sept. 16—U. S. adopted conscription.
- Sept. 22—Japan entered French Indo-China.
- Sept. 27—Japan joined Rome-Berlin axis.
- Oct. 11—Germany occupied Rumania.
- Oct. 28—Italy invaded Greece.
- Nov. 20—Hungary joined Berlin-Rome-Tokio axis.
- Nov. 23—Rumania joined Axis.
- Nov. 24—Slovakia joined Axis.

1941

- March 7—Britain captured Italian Somaliland.
- April 4—Germany invaded Yugoslavia.
- April 6—Britain completed capture of Ethiopia.
- April 7—Germany invaded Greece.
- April 13—Germany occupied Belgrade.
- April 18—Yugoslavia capitulated.
- April 27—Germany occupied Athens.
- May 20—Germany invaded Crete.
- May 30—Germany occupied Crete.
- May 31—Britain occupied Iraq.
- June 8—British and Free French invaded Syria.
- June 21—Ger., Finland, Rumania invaded Russia.
- June 22—Britain completed occupation of Syria.
- July 7—U. S. occupied Iceland.
- July 17—Germany captured Smolensk.
- Aug. 5—Roosevelt and Churchill met at sea; Aug. 14, signed the Atlantic Charter.
- Aug. 25—Britain invaded Iran.
- Aug. 28—Britain and Russia occupied Iran.
- Sept. 10—Germany captured Kiev.
- Nov. 26—Russia launched counterattack.
- Dec. 7—Japan attacked Malaya and Hawaii.
- Dec. 8—Britain and U. S. declared war on Japan.
- Dec. 9—Germany and Italy declared war on U. S.
- Dec. 10—U. S. declared war on Germany and Italy.
- Dec. 25—Japan captured Hongkong.

1942

- Jan. 1—26 nations sign United Nations pact.
- Jan. 14—U-boats began operations in Atlantic.
- Feb. 15—Singapore fell to the Japanese.
- March 8—Japanese cut Burma Road.
- April 9—Bataan (Philippines) fell.
- April 11—India rejected Cripps' proposals.
- April 18—Doolittle bombed Tokio.
- May 6—Corregidor surrendered.

May 8—Battle of the Coral Sea, Am. victory.
 May 31—British launched 1,000-plane drive on Cologne.
 June 1—Nazis started drive to Stalingrad.
 June 2—Mexico declared war.
 June 3—Japanese raided Dutch Harbor, Alaska.
 June 5-7—Battle of Midway.
 June 11—British-Russian treaty and U. S.-Russian lend-lease was announced.
 June 13—U. S. troops reached N. Ireland.
 July 1—Rommel drove British back to El Alamein.
 Aug. 7—U. S. Marines landed in Solomons.
 Aug. 17—Churchill arrived in Moscow.
 Aug. 22—Brazil declared war.
 Oct. 23—British open offensive in Egypt.
 Oct. 26—Japanese defeated off Solomons.
 Nov. 8—American forces landed in N. Africa.
 Nov. 11—Axis forces occupied all France.
 Nov. 19—Russians opened counter-offensive.
 Nov. 27—French fleet scuttled.
 Dec. 12—Transport President Coolidge sunk by mine.
 Dec. 24—Admiral Darlan assassinated.

1943

Jan. 14—Roosevelt and Churchill at Casablanca.
 Feb. 2—Battle of Stalingrad ended.
 March 20—Mareth Line (Africa) broken.
 April 7—Bolivia declared war.
 April 8—Battle of Guadalcanal, Am. victory.
 May 3—Japanese raided Port Darwin.
 May 7—Allies took Tunis and Bizerte.
 May 11—U. S. troops invaded Attu.
 May 12—All Tunisia taken by the Allies.
 May 22—U.S.S.R. dissolved the Comintern.
 June 12-13—Lampedusa and Lumsa surrendered.
 June 20—U. S. opened offensive in Solomons.
 July 10—Allies invaded Sicily.
 July 10—American airmen bombed Rome.
 July 25—Mussolini resigned.
 Aug. 14—Rome was declared an open city.
 Aug. 17—Sicily was taken by the Allies.
 Aug. 24—Russians captured Kharkov.
 Sept. 3—Italy was invaded by the Allies.
 Sept. 8—American Fifth Army landed on Salerno beaches; Italy's surrender was announced.
 Oct. 6—Corsica freed itself.
 Oct. 12—Portugal opened Azores to Allies.
 Oct. 13—Italy declared war against Germany.
 Oct. 18—Conference of Foreign Ministers at Moscow.
 Nov. 1—Americans landed on Bougainville.
 Nov. 6—Russians recaptured Kiev.
 Nov. 18—First heavy Allied air raid on Berlin.
 Nov. 21-24—Marines and soldiers take Tarawa and Makin Islands in the Gilberts.
 Nov. 22-25—Pres. Roosevelt, Prime Minister Churchill, Generalissimo Chiang Kai-shek conferred at Cairo.
 Nov. 28-Dec. 1—Pres. Roosevelt, Prime Minister Churchill, Marshal Stalin conferred at Teheran.
 Dec. 16—MacArthur's troops landed on New Britain.
 Dec. 24—Gen. Eisenhower given command of 1944 invasion of Europe.

1944

Jan. 3—Russian armies drive across border into Poland.
 Jan. 11—Moscow asks Poland to accept Curzon Line as eastern boundary.

Jan. 13—Great Allied air attack on Ger. begins.
 Jan. 15—Polish Government-in-Exile submits boundary problem to Br. and U. S.
 Jan. 17—Russ. rejects Pol. proposal to negotiate boundary differences. Ams. advance in It.
 Jan. 23—Allies land surprise troops on It. shore s. of Rome.
 Jan. 28—Jap. atrocities against Am. and Phil. prisoners captured Bataan and Corregidor reported.
 Feb. 2—Russ. grants increased autonomy to her 16 constituent republics.
 Feb. 5—U. S. officially assumes control of Marshall Islands.
 Feb. 18—Allied planes attack Jap. fleet and airbase at Truk, Caroline Islands.
 March 1—Allies seize bases in Admiralty Islands.
 March—Russians enter Latvia and Estonia.
 April 10—Russians recapture Odessa and begin invasion of Rumania.
 April 22—Allies land at Hollandia, New Guinea.
 April—Allied fleet raids Sabang, Sumatra.
 April 28—Death of Frank Knox, Secretary of the Navy.
 May—Allies intensify air-bombing of German war industries, and of railroad centers and airdromes in German-occupied countries.
 June 6—Invasion of Europe begins with landing of Allied forces on the northern coast of France.
 June 15—Marines invade Saipan. First Ger. robot bombs begin falling on England.
 June 16—B-29s bomb Yawata, Japan, from China.
 July 20—Attempted assassination of Hitler by group of generals reported by Gers.
 July 21—Guam invaded; Tinian on the 24th.
 July 27—Am. troops in Normandy break Ger. defense line at Avranches, begin pursuit of Germans across France.
 Aug. 15—Allies land in southern France.
 Aug. 21—Russians cross onto Ger. soil in E. Prussia.
 Aug. 25—Paris liberated.
 Sept. 4—Finland signs armistice with Soviet Union, leaves war.
 Sept. 8—Russ. Army enters Bulgaria.
 Sept. 9—Bulgaria signs armistice with Allies and leaves war as Iron Guard Government is overthrown.
 Sept. 12—Am. First Army troops cross Ger. border east of Aachen.
 Sept. 14—Russ. troops invade Hungary and Czechoslovakia.
 Sept. 15—Marines land in the Palau Islands.
 Sept. 17—Allied airborne landings at Arnhem repelled by Gers.
 Oct. 10—Am. forces land on Leyte, Gen. MacArthur's return to Philippines.
 Oct. 23-25—In three separate engagements in Battle for Leyte Gulf Japs lose 24 ships, and the fleet is no longer a threat.
 Nov. 4—Liberation of Greece completed.
 Nov. 24—B-29s from Saipan bomb Tokyo.
 Dec. 16—Powerful Ger. counter-attack at Ardennes Forest.
 Dec. 28—Allied counter-attack launched by Gen. Eisenhower; the beginning of a six-weeks' campaign which wiped out Ger. bulge.

1945

Jan. 3—Russian armies drive across border into Poland.
 Jan. 11—Moscow asks Poland to accept Curzon Line as eastern boundary.
 Jan. 9—Gen. MacArthur invades Luzon, reaching Manila 26 days later.
 Jan. 14—Warsaw is liberated; Russ. winter offensive drives Gers. from Poland and cuts into Ger.

Jan. 15—ELAS and Br. cease hostilities in Greece.
 Jan. 20—Hungary signs armistice with United Nations.
 Feb. 8—Roosevelt, Churchill and Stalin meet at Yalta, to plan final phase of war against Ger. and outline peace.
 Feb. 13—Budapest falls to Russ. Army.
 Feb. 16—Bataan recaptured by Americans.
 Feb. 17—Am. paratroops land on Corregidor.
 Feb. 19—Iwo Jima invaded.
 March 2—Allied troops reach the Rhine opposite Duesseldorf.
 March 5—Cologne falls to Am. First Army troops.
 March 7—First Allied crossing of Rhine made at Remagen.
 March 16—Am. 3rd and 7th Army troops attack in Saar Basin; secured in one week.
 March 23—Am. 3rd Army crosses Rhine above Mannheim.
 March 24—Br. and Am. forces cross Rhine in the north, drive on the Ruhr.
 April 1—Am. forces invade Okinawa.
 April 5—Russ. denounces neutrality pact with Japan.
 April 11—Am. troops reach Elbe R.; Coblentz and Essen fall.
 April 12—Pres. Roosevelt dies.
 April 13—Vienna falls to Russ. Army.
 April 21—Russians thrust into Berlin.
 April 25—World Security Conference opens at San Francisco.
 April 25—Am. and Russ. Armies meet below Berlin.
 April 28—It. patriots assassinate Mussolini.
 May 1—Ger. radio reports death of Hitler; Admiral Karl Doenitz named head of state.
 May 2—Stalin announces surrender of Berlin.
 May 2—Allies announce surrender of Ger. troops in Italy, s. and w. Austria.
 May 3—Br. take Rangoon and liberate Burma.
 May 5—Gers. in Holland, Denmark and n. Ger. surrender.
 May 7 (May 6, E.W.T.)—Ger. surrenders unconditionally to Allies.
 May 24-30—Industrial Tokyo bombed.
 May 27—Admiral Halsey relieves Admiral Spruance as commander of combined Third-Fifth Fleet.
 June 2—Jap troops withdraw from Indo-China.
 June 5—Kobe attacked by B-29s.
 June 6—Okinawa falls to U. S. troops.
 July 26—Ultimatum from Potsdam Conference calls on Japan to surrender.
 Aug. 6—Americans drop atomic bomb on Hiroshima.
 Aug. 9—Russia enters war against Japan; atomic bomb strikes Nagasaki.
 Aug. 10—Jap. offers to surrender.
 Aug. 14—Japs agree to accept terms.
 Aug. 28—First Am. troops land in Japan.
 Sept. 2 (Sept. 1 E.W.T.)—Japan formally surrenders to the Allies in ceremony aboard U.S.S. *Missouri*; is permitted to retain Hirohito as puppet Emperor. Pres. Truman proclaims V-J Day.
 Sept. 5—Lt. Gen. Yamashita surrenders all Jap armies in Philippines to Lt. Gen. Wainwright.
 Sept. 8—Am. 1st Cavalry Div. escorts MacArthur into Tokyo.

Worms, town in Germany, in which are many features of historic interest. Originally the Celtic Borbetomagus, Worms was a Roman town till the 5th century. Numerous diets were held here. The most famous of these

was the Imperial Diet of 1521, before which Luther made his celebrated defense. Some of the more stirring events in the history of Worms find a place in the *Nibelungenlied*; p. 49,000.

Wormwood, an aromatic herb, *Artemisia absinthium*, which has long been held in high repute for its bitter properties. It is used in the preparation of absinthe.

Worsted. See **Woolen Textiles**.

Worthington, Henry Rossiter (1817-80), American inventor, was born in Tarrytown, N. Y. In 1841 he patented his first pump, which he continued to develop until it became the complicated and efficient mechanism used in modern city waterworks. In 1854 he patented a direct-acting compound steam engine.

Wounds may be either subcutaneous or open with division of the integument. A contusion of soft parts and a simple fracture of bone are examples of subcutaneous wounds. Open wounds are described as incised, lacerated, contused, or punctured, according to the manner of their production.

Wrangell, island, Alexander archipelago, Alaska. It was named by the Russians after Admiral Baron Ferdinand von Wrangel. The area is 220 sq. m.

Wrangell, or **New Columbia**, island, Arctic Ocean, off the northeast coast of Siberia. It was visited in 1881 by Hooper, who took possession for the United States. The area is about 1,500 sq. m.

Wrangler. This word is used to distinguish one who has passed the mathematical examination for the bachelor's degree in the University of Cambridge with such credit as to have had his name inscribed in the highest list, or list of wranglers.

Wrath, Cape, northwest extremity of Scotland. It is a pyramidal mass, rising 300 ft. sheer out of the sea.

Wreck, a ship which has been rendered hrough injury absolutely unnavigable or unable to pursue her course without repairs exceeding one-half her value; also goods from a shipwreck which are cast upon land by the sea.

Wren, a general name for the members of the family Troglodytidae, which are small passerine birds, most abundant in tropical America, but also found in northern latitudes. The general color is brown, often with white under parts. Insects and spiders and their larvae form the main part of the food. All of the wrens are noisy, but most of them in spring utter a melodious song. Some fifteen species,



Evacuation of Dunkirk.

Wide World Photos



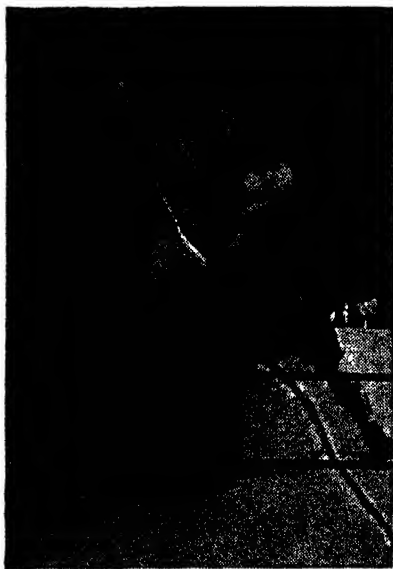
The Allied Landing on Normandy Beach.

Press Association, Inc.

with many sub-species, are recognized in North America, of which the most familiar is the house wren.

Wren, Sir Christopher (1632-1723), English architect, was born in East Knoyle, Wiltshire. In 1663 he was commissioned to survey and report upon St. Paul's Cathedral, with a view to its restoration, and was engaged on the Sheldonian Theatre, Oxford, and Trinity College, Cambridge. After the great fire of London he was commissioned to rebuild the Royal Exchange, Chelsea Hospital, the Custom House, Temple Bar, the Monument; also Greenwich Hospital, Hampton Court, Buckingham Palace.

Wren, Percival Christopher (1885-1941), English novelist, was educated at Oxford. He wrote *Beau Geste* (1924); *Beau*



A Wrestling Contest.

Sabreur (1926); *Beau Ideal* (1928); *Port o' Missing Men* (1934); *Two Feet from Heaven* (1940).

Wrestling is common to all nations, and has been brought to a science in countries so widely separated as the United States, Turkey, India, China, and Japan, each of which has its own laws and methods for the sport. The ancient Greeks held wrestling in high repute, as the public contests for professional wrestlers at Delphi, Corinth, Nemea, and Olympia testify.

In 1952 the heavyweight champion of the National A. A. U. was Dorfman of Minne-

sota. Glass of Princeton defended successfully his heavyweight title in the Eastern Intercollegiate contests. For Japanese style of wrestling, see JU-JIRSU.

Wrexham, municipal and parliamentary borough, Wales. St. Giles' church has a magnificent 16th century tower. The ancient churchyard contains the tomb of Elihu Yale, founder of Yale University. There are malt, iron, and terra-cotta works, tanneries, and breweries; p. 18,567.

Wright, Frank Lloyd (1869-), American architect; studied at Univ. of Wisconsin. He was a pioneer in his field; was the first to use textile-block slab construction. Among his finest buildings are the Imperial Hotel, Tokyo, Japan; and the Edgar Kauffmann house, Pittsburgh, Pa.

Wright, Joseph (1756-93), American painter, was born in Bordertown, N. J. He painted portraits of Washington, Mrs. Washington, John Jay, Madison, and other prominent persons. He was appointed by Washington draughtsman of the Philadelphia Mint in 1792, and designed the earliest coins and medals of the United States.

Wright, Luke E. (1847-1922), American executive. In 1900 he became a member of the Philippine Commission; and in 1905 the first American governor-general. During 1906-7 he was ambassador to Japan, and in 1908 he became Secretary of War.

Wright, Orville (1871-1948), Amer. aeronaut, brother of Wilbur Wright, was born in Dayton, O. He began the study of aviation with his brother in 1896, when they were engaged in building and repairing bicycles at Dayton. They built in 1903 the first flying machine to raise itself by its own power with a man in it. On Sept. 11, 1908, Orville broke all records for time and distance flight by heavier-than-air machines. This record was broken ten days later by his brother. In the following year he fulfilled the U. S. Government specifications for duration and speed, and the Wright machine was accepted by the Government and purchased for the use of the Signal Corps. In 1909, also, Orville made a world's altitude record of 1,637 ft.

Wright, Silas (1795-1847), American statesman; practiced law in Canton, N. Y. After serving in state senate and U. S. Congress, was U. S. Senator 1833-44 and prominently supported the Jackson administration; later was Governor of New York.

Wright, Wilbur (1867-1912), American aeronaut, brother of Orville Wright, was born near Millville, Ind. He devoted his attention

with his brother Orville, to the development of the heavier-than-air type of flying machine. In 1908 he broke the world's flight record for time and distance (1 hour, 31 minutes, 51 seconds). He made other record flights while in France, closing the year with a flight of 76.5 m.—the world's record for distance. He is said to have been the first man to make a successful flight in a heavier-than-air machine.

Writ, a judicial process or mandate by which some action or proceeding is begun, or order of the court enforced. The most important proceeding under a writ is *habeas corpus*.

Writing. The methods of writing of the ancients are treated of under PALEOGRAPHY, HIEROGLYPHICS, INSCRIPTIONS, and PICTURE WRITING. As regards modern writing, previous to the invention of the printing press writing was divided into bookhand and cursive. Nowadays cursive writing alone is in use.

Wryneck (*Lynx*), an Old World genus of birds, related to the Woodpeckers. The plumage is curiously mottled with black, brown, gray, and white. Wrynecks feed upon insects, which they find chiefly upon the ground. Its habit of hissing when molested, and at the same time twisting the neck and turning the head about, give it the popular name of *snake-bird*. This species is widely spread over Europe and Asia, while the other three species are African.

Wu-chang, town, capital of the province of Hupeh, China. It has cotton mills, iron works; p. 500,000.

Wu-chau-fu (Wuchow), town and treaty port, province of Kwangsi, China. The city is the port of trans-shipment of sea-borne goods for the West; p. 77,000.

Wu-hu, town and treaty port, province of An-hui, China. The chief exports are rice, wheat, silk, tea, furs, feathers, beans, timber; p. 130,000.

Wulfenite (PbMoO_4), native lead ore, occurring in tetragonal crystals, in veins accompanying other lead ores, sometimes associated with chromium or vanadium.

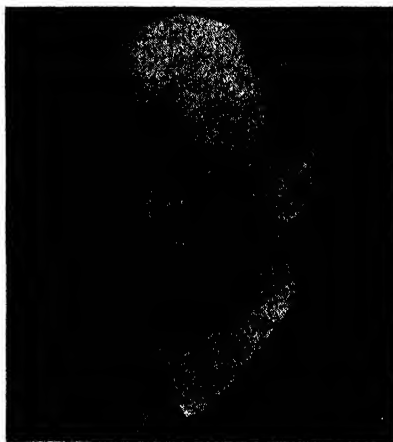
Wulfstan (*Lupus*), archbishop of York from 1003 till his death in 1023, and at the same time bishop of Worcester till 1016. For him Ælfric wrote his pastoral letter, *Sermo ad Sacerdotes*. In the years 1010-11 Thurkill laid the country waste from East Anglia to Wessex, and these raids formed the occasion of Wulfstan's homily *Sermo Lupi ad Anglos*.

Wurde mann, Audrey (1911-), poet.

She began writing at the age of 14. Her first published book, *Bright Ambush*, won for her the Pulitzer Prize in 1935. She is the wife of Joseph Auslander, poet and editor. Her poems have appeared in the Forum, Poetry, Scribner's and the Saturday Review of Literature. Among her poems are *Love's Instant*, *Harvest*, *Persephone* and *Sonnets*.

Wurtemberg, state of Germany lying between Bavaria, Baden, and Switzerland, and drained for the most part by the Neckar and its tributaries; area 7,532 sq. m.; p. 2,695,942. The Danube crosses the country toward the s. The most striking geographical feature is the Swabian Alb. The Black Forest borders the kingdom on the w. Agriculture is the principal industry. The chief crops are hay, oats, spelt, potatoes, barley, wheat, rye. The breeding and grazing of cattle is an important industry. There is considerable manufacturing industry of a varied character, the more important branches producing iron, gold and silver goods, cutlery, firearms, textiles. The state university is at Tübingen, the Conservatory of Music and polytechnic high school at Stuttgart.

Würzburg, capital of the province of Lower Franconia, Bavaria. The Romanesque cathedral was founded in the 9th century, enlarged in the 11th century, and restored in 1882-3. The Marienberg fortress, which occupies the site of a Roman fort, stands on a



Wilbur Wright.

hill overlooking the river on the left bank; until 1720 it was the episcopal palace. The new Episcopal Palace, now the Royal Palace, a splendid example of the rococo style, was

built in 1720. The city has manufactures of tobacco and cigars, musical, surgical, and mathematical instruments and furniture, machinery and railway carriages, wine, beer, liquors, vinegar, and chocolate.

Wu Ting-Fang (1842-1922), Chinese diplomat and statesman. He participated in the negotiations leading up to the treaty of Shimonoseki, which ended the Chino-Japanese War. From 1896 to 1902 he was minister to the United States.

Wyandots, a tribe of North American Indians, a branch of the Hurons, who in the 17th century moved from Canada to the right bank of the Detroit River, in Michigan, and thence ranged into Ohio. There are about 800 still in the tribal state, distributed with the Hurons in Oklahoma and Quebec.

Wyandotte, an American breed of fowl, varying in color from white to buff, golden, and black, and having close, rose-colored combs and fluffy plumage.

Wyandotte Cave, a remarkable cavern in Crawford co., Indiana. It is 23 m. long.

Wycherley, William (c. 1640-1716), English dramatist, attended Oxford. He wrote *Love in a Wood* (1671); *The Plain Dealer* (1674); *The Country Wife* (1675).

Wycliffe, Wyclif, or Wickliffe, John (c. 1320-84), English religious reformer, is said to have been born in Hipswell, near Richmond, Yorkshire. His theory of dominion and his attacks on the papal supremacy made him popular among the Londoners; and his desire to reform the corruption of the clergy secured for him the powerful support of the nobles, of John of Gaunt, and of the Prince of Wales. His writings were widely read; his translation of the Bible became very popular; and he organized a body of poor priests, the Lollards, who spread his teaching throughout the land.

As the champion of national rights against the papacy, Wycliffe by the time of Wat Tyler's rebellion had become one of the most powerful men in England. He himself had no direct part in inspiring the rebellion, but there is no doubt that his poor priests had a considerable, if indirect, share in organizing the movement. The main characteristic of his teaching was his repudiation of formalism and insistence on inward religion. See **LOLLARDS**.

Wycombe, High Wycombe, or Chip-ping Wycombe, municipal borough, England. Buildings of interest are the Church of All Saints (13th century) and the Guildhall. Chair making and cabinet works are the chief industries; p. 27,691.

Wye, river, Wales and England, rises on Plinlimmon, and flows s.e., e., and s. to the Severn estuary. It is famed for its beautiful scenery. Length, 130 m.

Wyeth, John Allen (1845-1922), American surgeon, was born in Marshall co., Alabama. In 1882 he founded the New York Polyclinic Medical School and Hospital, the first post-graduate medical school established in America; became professor of surgery there; and president of the school in 1893. He is the author of *Text Book on Surgery* (1888); *Bloodless Amputation at the Hip Joint* (1890); *With Sabre and Scalpel* (1915) (an autobiography).

Wykeham, William of (1324-1404), English prelate, Chancellor of England, was born in Wykeham, Hampshire. Edward III. appointed him guardian of several of his manors, and clerk of the works at Henley (1348). He was next created surveyor of the king's works at Windsor (1356), and erected the great quadrangle to the e. of the keep (1359-69). In 1364 he was appointed Keeper of the Privy Seal, and soon after principal Secretary of State, while he was consecrated bishop of Winchester in 1367, and Chancellor of England, an office he held the first time till 1371. He founded two colleges—Winchester College (1387), and New College, Oxford (1380).

Wylie, Elinor (1885-1928), poet and novelist. Her true literary career began with *Nets to Catch the Wind* (1921), which was awarded the Julia Ellsworth Ford Prize by the Poetry Society of America for the best verse of the year. She has written four historical imaginative romances: *Jennifer Lorn* (1923); *The Venetian Glass Nephew* (1925); *The Orphan Angel* (1926); *Mr. Hodge and Mr. Hazard* (1928). Her volumes of verse include: *Black Armour* (1923); *Trivial Breath* (1928); *Angels and Earthly Creatures* (1929). Consult: L. Jordan, *Elinor Wylie*.

Wyman, Walter (1848-1911), American surgeon, was born in St. Louis, Mo. He established the first government tuberculosis sanatorium; and was twice president of the International Sanitary Conference. He was also chairman of the Yellow Fever Institute of the Marine Hospital Service; director of the quarantine and marine hospitals of Porto Rico, Hawaii, the Philippines, and Alaska. He was instrumental in the adoption of the present quarantine laws (1893), and was active in the amelioration of sanitary conditions affecting the health of seamen.

Wynants, or Wijnants, Jan (1615-79), chief representative of the Dutch school of landscape painting, was born in Haarlem. His pictures are characterized by minuteness of detail and delicacy of aerial perspective.

Wyoming (Delaware Indian, meaning 'large plains'), one of the Western States of the United States; area 97,914 sq. m.; p. 290,529.

Lying in the Rocky Mountain region, the State is one vast plateau, ranging in elevation from 4,000 to 7,000 ft., and broken here and there by a number of mountain ranges. The most considerable mountain mass is found in the northwest corner, the subordinate ranges being the Snow and Shoshone Mountains, and the Gros-ventre, Salt River, and Teton Ranges. Farther s.e. come the Wind River Range, the Sweetwater Mountains, and the Medicine Bow Mountains, which last, with the Laramie Range, lying n.e. of them, enclose the Laramie Plains. In the northwest corner is the Yellowstone National Park. The highest peaks in the State are Gannett (13,785 ft.); Grand Teton (13,747 ft.); Frémont (13,730 ft.); Helen (13,600 ft.). The drainage e. of the Divide is into the tributaries of the Missouri River, and w. of the Divide into those of the Columbia and the Colorado.

Wyoming is famous for the rugged natural beauty of its scenery. Along the northern border from the Black Hills to Yellowstone Park, and to the South of the Park in Teton, Fremont, Sublette and Lincoln counties in the Teton and Wind River ranges are gorgeous colorings of wonder-shaped rocks, geysers, water falls, forests and mountains. Tourists are attracted to the mineral hot springs, particularly at the famous health resorts of Thermopolis and Saratoga. In Big Horn National Forest are about 300 lakes; every mountain range has its lakes with an abundance of fish. In the large ranges and game preserves, elk, antelope, deer and other game are increasing. Mountain sheep, the grizzly, brown and black bear, and other game are abundant, especially in the famous Jackson's Hole district.

Wyoming is rich in mineral resources. The most important minerals are petroleum, natural gas, and coal. In 1940, the output of metal mines was 2,000 ounces of gold and 246 ounces of silver. The greater part of the wooded area of the State is included in the National Forests, comprising 8,500,000 acres. The Grand Teton National Park was established in 1929. The principal crops are hay and forage, wheat, white potatoes, oats, sugar beets. Sheep and cattle grazing is the most

important industry. The University of Wyoming, at Laramie, is the principal institution for higher learning in the State.

History.—The earliest visitors to the region now included in Wyoming were fur traders. John Colter, the first American visitor, spent the winter of 1806-07 on Pryor's Peak, and discovered Shoshone Lake and the Yellowstone country. The discoveries of Captain Bonneville, who visited the Wyoming country in 1832, are recorded by Washington Irving. In 1842 the United States exploring expedition under General Fremont reached the Wind River Mountains and ascended Fremont Peak, under the guidance of Kit Carson.

The first white settlement was made in 1834 at Fort William (later Fort Laramie) by William Sublette and Robert Campbell. The bulk of the present State came into the possession of the United States in 1803 with the Louisiana Purchase. The section included in the basin of the Columbia River became part of the United States along with the Oregon territory; and the southwest corner of the State was acquired from Mexico at the time of the Mexican War (1848). Previous to 1867 there was scarcely any development or permanent settlement in the territory; but the discovery of gold in the Sweetwater Valley, the completion of the Union Pacific Railroad, and the discovery of coal near Evanston in 1868 caused a rush of immigration. Cheyenne was settled in July, 1867, and before the close of the year had 6,000 inhabitants. In 1869 it was made the territorial capital. Serious Indian troubles began in 1854, when the Sioux tribe massacred Lieutenant Grattan and 28 of his men at Fort Laramie, and continued at intervals until the massacre of the command under Custer in 1876. In 1872 the Yellowstone Park region was set aside by Congress as a public reservation. To this was added, in 1891, a forest reserve. Wyoming became a State on July 10, 1890. See W.P.A. Writers' Project, *Wyoming* (1941).

Wyoming Valley, a picturesque valley, 23 m. long by 3 broad, along the north branch of the Susquehanna River, in Luzerne co., Pennsylvania. It has gained a place in American history on account of the slaughter of settlers on July 3, 1778, by a force of Tories and Indians under Col. John Butler.

Wyss, Johann Rudolf (1781-1830), Swiss man of letters, was born in Berne, where he spent his days as professor of practical philosophy and curator of the museum and library. He was the author of the *Swiss Family Robinson* (1812-13).

X. In some of the early Greek alphabets this sign has the value *ks*; in others its value is *χ*, spirant *k*. The sound of *x* is very unstable. In Latin it tended to become *s*. In English the letter is uncommon. It is sometimes pronounced *gz* ('example') and *z* at the beginning of words originally Greek ('Xenophon'). Other sounds also are represented by it in other modern alphabets—French and Spanish.

Xanthine, $C_8H_4N_2O_4$, a nitrogenous compound, closely allied to uric acid, that occurs in extract of meat and in tea. It forms a colorless powder slightly soluble in water, and yields alloxan and urea on oxidation.

Xanthippe, wife of Socrates, lived in the 5th century, B.C. Her quarrelsome character led to the use of her name as signifying a shrew.

Xanthus, chief city of Lycia, stood on the west bank of the river of same name, 7 or 8 m. from its mouth. Twice in antiquity it endured sieges, which the inhabitants ended by destroying themselves and their property—first by the Persians under Harpagus (545 B.C.), and secondly by the Romans under Brutus (43 B.C.). Its ruins were explored by Sir C. Fellows.

Xavier, Francis (1506-52), apostle of the Indies, was born near Sanguesa in the n. of Spain. In 1534 he became associated with Loyola in the foundation of the Society of Jesus. John III. of Portugal sought for agents to Christianize the Portuguese colonies in India. Xavier was chosen, and landed at Goa on May 6, 1542. Thirty churches were speedily organized near Cape Comorin. He then visited Malacca, the islands of Banda, Amboyna, and the Moluccas. In 1549 he landed in Japan, where he speedily won adherents. He was canonized in 1622. His festival is on Dec. 3. Consult Coleridge's *Life*.

Xenia, city, Ohio, county seat of Greene co. It is the trading centre of a rich agricultural district. Near by is Wilberforce University (for the Negroes), founded in 1856; p. 10,633.

Xenocrates (386-314 B.C.), of Chalcedon, Greek philosopher. In philosophy, especially ethics, he followed Plato, though his theories as

to number resembled Pythagorean doctrines.

Xenon (Xe, 128) is the heaviest and rarest of the elementary gases of the argon family present in the atmosphere, in which it occurs to the extent of about one part in twenty millions.

Xenophanes (c. 576-480 B.C.), of Colophon in Asia Minor, founder of the Eleatic philosophy.

Xenophon (c. 430-355 B.C.), Greek historian and philosophical writer, was a native of Athens and a pupil of Socrates. His historical works include the *Anabasis*; distinguished by the simplicity and candor of its style, the vividness of its pictures, and its fulness of detail (however, both its authenticity and historical value have been questioned, the latter not without reason); the *Hellenica*; and the *Agelisaus*. The works relating to Socrates are the *Memorabilia*; the *Apology*; the *Œconomicus*; and the *Symposium*. The essays on political philosophy are a tractate, *On the Constitution of the Lacedæmonians*; the *Hiero*; the *Cyropædia*; and the treatise *On Athenian Revenues*. Xenophon's technical tracts are three in number—the *Hipparchicus*; *On the Horse*; and *On Hunting*. He was the earliest writer of what is known as the 'common dialect' of Greek, which eventually spread over the Eastern world and from which modern Greek is derived.

Xerxes, king of ancient Persia from 485 to 465 B.C., was the eldest son of Darius, whom he succeeded. Immediately upon his accession he began to make preparations for the invasion of Greece. Two of the greatest works performed were the cutting of a canal through the isthmus of Mt. Athos and the bridging of the Hellespont. Xerxes accompanied his forces on their march through Thrace, Thessaly, and Locris, witnessed the battle of Thermopylæ, and from the Attic coast beheld the destruction of his fleet at Salamis. He then retired with great speed into Asia (480 B.C.). In 465 he was murdered by two of the officers of his court; he was succeeded by his son Artaxerxes.

Ximenez de Cisneros, Francisco (1436?-1517), Spanish cardinal and statesman, lived in Rome as consistorial advocate (1464-72). He

was appointed confessor to Queen Isabella in 1492 and in 1495 succeeded Mendoza as archbishop of Toledo. To Ximenez is mainly due the establishment of the Spanish Inquisition (of which he was chief) as a political force. He founded and endowed the University of Alcalá de Henares (1500), which was removed to Madrid in 1836. At Alcalá he printed the great 'Complutensian Polyglot' Bible.

X Rays. See **Vacuum Tubes.**

Xylonite. See **Celluloid.**

Xylophone, a musical instrument arranged like the steel plates of the bells and with wooden resonators like those of the celesta; it is used in orchestra for special effects.

X. Y. Z. Correspondence. A number of letters written by agents of the French Directory (1797) to the American commissioners in Paris. The French republic had expected aid from the United States in the war against England begun in 1793, and was so exasperated by Washington's proclamation of neutrality that French privateers began to prey upon Ameri-

can commerce. After the failure of the American minister, James Monroe, to secure satisfaction, the Directory refused (Dec. 11, 1796) to receive his successor, C. C. Pinckney. At a special session of Congress Pinckney, John Marshall, and Elbridge Gerry were made special commissioners to France. There they were met by the agents of Talleyrand, minister of foreign affairs, with demands for a loan, or the purchase at half their face value of certain Dutch stocks. This the envoys refused. Meanwhile (April 2, 1798) the Republicans in Congress demanded that President Adams publish the dispatches. He complied, using, however, the letters X., Y., and Z. to designate the three agents. Talleyrand attempted to deny the authenticity of the letters, but the friends of France in America joined the Federalists in the demand for war. This enthusiasm had effect on the Directory, and in August the embargo on American ships was raised, privateers were ordered not to molest them, and the appointment of an American minister was asked.

Y

Y

Yale

Y. This letter is the Greek form of U. It was first adopted by the Latin alphabet in the form of V, with a distinctive Latin value. In the 1st century B.C. it was again borrowed, but this time for use in Greek words, in the form Y and with a Greek value. It is, therefore, properly a vowel. As an English vowel *y* is now interchangeable with *i*, except that *y* is preferred at the end of words, and to represent Greek Y. The use of *y* as a consonant, as in 'yard,' is practically peculiar to English.

Yacht. Yachting as a pastime may be said to date from 1720, when the Water Club of the harbor of Cork was founded; but not much progress was made until the foundation of the Royal Yacht Squadron at Cowes in 1812. In 1884 the New York Yacht Club was organized at Hoboken, N. J., by John C. Stevens. By 1846 yacht racing had secured a strong hold in the United States, and several new types of vessels were evolved. The yacht *America* crossed the Atlantic in 1851 to compete at Cowes, and in a race for a cup presented by the Royal Yacht Club was successful in transporting the cup to the United States, where it has since remained, being now in the possession of the New York Yacht Club. See AMERICA CUP. Since then almost every year has seen improvements alike in design and build. Sailing yachts may be broadly divided into two classes—cruising and racing.

In 1946 the Astor Cup Race, 25 miles, was won by J. B. Shethar's *Sylvia* in 3 hours 13 minutes 36 seconds. The King's Cup Race, 21 miles, was won by H. S. Morgan's *Djinn* in 2 hours 38 minutes 28 seconds. The New London, Conn. to Hamilton, Bermuda race was the first since 1938. A. H. Fuller's *Gesture*, Class A, won in 3 days, 23 hours. R. F. De Coppet's *Suluau*, Class B, won in 4 days, 6 hours. G. Brooks in *Sea Gypsy* made a record run in the race from St. Petersburg, Fla. to Havana in 35 hours 50 minutes.

Yak, a species of ox, found on the high plateau of Tibet, and in the neighboring parts of Central Asia, where it occurs in both the wild and domesticated state. The yak is valued as a beast of burden and for its rich milk, which yields excellent butter and curds.

The flesh is eaten, the hair spun into rope, and the fur into cloth.

Yakima, a confederation of North American Indians. They were first visited by Lewis and Clark in 1804. In 1855 they ceded their lands to the U. S. Government, and were gathered on the Yakima Reservation, where they are now largely engaged in farming.

Yakima, city, Washington, county seat of Yakima co. It is an agricultural centre, shipping fruit, especially apples, hay, vegetables, and live-stock; p. 38,486.

Yakuts, a Ural-Altaic people of the Turki stock, inhabiting Yakutsk. To some extent they are nomadic, but their usual dwelling is the wooden *yurt*, with sloping, turf-clad walls.

Yakutsk, an autonomous republic of U. S. S. R. in eastern Siberia; p. 325,000. Of its rivers, the Lena is by far the largest; it is the chief channel of communication. The climate is of remarkable severity, lower temperatures being recorded (down to -80° F.) than were experienced by Nansen in the Polar regions, and the ground being always frozen to a depth of three or four feet. Cattle grazing, horse breeding, hunting and gold mining are the chief occupations. Yakutsk is the chief town; p. about 10,000.

Yale, Elihu (1649-1721), English philanthropist, was born in or near Boston, Mass. He entered the service of the British East India Company, and went to India about 1678. Here he acquired great wealth in private trade; was governor of Fort St. George, Madras (1687-92); and returning to England, was elected (1699) governor of the East India Company. Between 1714 and 1721, through the influence of Jeremiah Dummer, Yale made valuable gifts of books and money to what was then the Collegiate School at Saybrook, Conn. When the school was removed to New Haven, the new building, opened in 1718, was named for Yale.

Yale, Linus (1821-68), American inventor, was born in Salisbury, N. Y. In 1851 he patented a new form of lock for bank doors and vaults and subsequently patented various other devices in lock making, his productions soon becoming widely known. In 1868 he

joined with Henry R. Towne in forming the Yale & Towne Lock Company at Stamford, Conn.

Yale University, one of the oldest and most influential institutions of higher learning in the United States, is located in New Haven, Connecticut. The plans of the first settlers of New Haven in 1638 included the establishment of a college, but nothing came of this project until the beginning of the 18th century. Until then the only seat of learning in the scattered New England communities was Harvard College, founded in 1636, and supported mainly by Massachusetts Bay. With the development of independent life and thought in the new colony on the Quinnipiac came a movement to have a separate college in Connecticut and in the summer of 1701 some of the principal ministers of Connecticut, meeting in Branford, offered gifts of books for the founding of a college. In October, 1701, the Colonial Assembly granted a charter for a 'collegiate school,' which was organized the same year and located at Saybrook. In 1716, after a bitter controversy, it was removed to New Haven, and in 1718 the name Yale College was adopted in honor of Governor Elihu Yale, who had generously aided the institution with gifts of money and books. In 1745 a new charter was granted by the Assembly legalizing the name 'Yale College.'

During the Revolution, owing to the scarcity of provisions in New Haven, the students were temporarily removed to Farmington, Glastonbury, and Wethersfield. In the last decade of the 18th century the opposition to the college which had long existed in the Legislature was overcome; the college received State funds to the amount of over \$40,000; and the governor, lieutenant-governor, and six senior senators were added to the corporation.

In the early 19th century instruction was begun in the departments of medicine (1813), divinity (1822), and law (1824). Graduate courses in philosophy and the arts were organized in 1846, and the degree of Doctor of Philosophy was first conferred in the United States at Yale in 1861. In 1854, through the union of the School of Applied Chemistry (1847) and the School of Engineering (1852), the Yale Scientific School was founded. It assumed the present title of Sheffield Scientific School in 1863, in recognition of the gift by Joseph E. Sheffield of a building and permanent fund. In 1866 the School of the Fine Arts was founded. The more recent additions have been the School of Music (1864), the School of Forestry (1900), and the School of

Nursing (1923). In 1887 the Corporation legally adopted the name Yale University.

Special buildings include the University Library, the Gallery of Fine Arts; the Peabody Museum of Natural History; the Observatory; the University Theatre; the Botanical Garden, connected with the School of Forestry; the Gymnasium; and the Yale University Press, founded in 1908.

In 1933 the residential college plan was put into effect with the opening of the residential colleges which were made possible through gifts from Edward Stephen Harkness, B.A., 1897. In the life of the colleges every student has opportunities for membership in a social unit, and for frequent meetings with faculty members. Each college has accommodations for 160 to 200 students and has at its head a master.

Yale Field, the general athletic ground of the University includes the Yale Bowl, opened in 1914, seating 74,786 people; the Charles E. Coxé Field Gymnasium; the Lapham Field House, which contains locker accommodations for 2,000 students; baseball diamonds; the Phipps Polo Field; a running track; soccer and lacrosse fields, and tennis courts.

The Yale University Press was founded in 1908 for the purpose of advancing the cause of scholarship and letters by the publication of works possessing permanent interest and value. The University publishes *The Yale Review* and the *American Journal of Science*, the oldest scientific publication in the United States, which was founded by Professor Benjamin Silliman in 1818, and edited and published for over one hundred years by members of a single family in the Yale faculty. Among student publications are *The Yale Law Journal*, *Yale Literary Magazine* (founded in 1836), the first undergraduate publication in the country, *The Yale Daily News* (1878), the oldest college daily, the *Yale Record*, a humorous monthly, the *Yale Scientific Magazine*, the *Yale Divinity School News*, the *Yale Forest School News*, the *Yale Banner and Pot Pourri*, and the *Yale Journal of Biology and Medicine*.

There are numerous clubs and fraternities and (in the College) local Senior societies of which Skull and Bones is the oldest.

The chief executives of the University have been: rectors, Abraham Pierson (1701), Samuel Andrew (1707), Timothy Cutler (1719), and Elisha Williams (1726); presidents, Thomas Clap (1740), Naphthali Daggett (1766), Ezra Stiles (1778), Timothy Dwight (1795), Jeremiah Day (1817), Theodore Dwight Woolsey (1846), Noah Porter (1871),

Timothy Dwight (1886), Arthur Twining Hadley (1899), James Rowland Angell (1921), Charles Seymour (1937).

Yalu, Amnok, or Apnok, river of Korea, rises in Paik-tu-san Mountain, in Manchuria; flows generally s.w., forming the boundary between Korea and Manchuria; and enters Korea Bay. It is 300 m. long.

Yalu, Battle of the, the first important land engagement of the Russo-Japanese War, was fought on May 1, 1904. The Japanese forces, under General Kuroki, had concentrated in the vicinity of Wiju during the week preceding the battle, while the Russians, under General Sassulitch, occupied fortified positions on the opposite bank of the river. On the morning of May 1 the Japanese artillery opened fire, and the infantry advanced across the Yalu and its tributary, the Ai Ho. The Russians were routed, their losses being placed at 3,000 men; the Japanese lost 1,000 men.

Yam, the name given to certain tropical plants of the genus *Dioscorea*, extensively cultivated in China, Polynesia, and the West Indies. They are grown for their fleshy, edible roots or rhizomes, which are cooked and eaten in much the same way as potatoes.

The Winged Yam of Polynesia (*D. alata*) is generally held to be the original of all or most of the varieties cultivated in tropical Asia, Africa, and America. The Common Yam of the West Indies (*D. sativa*) and a Prickly Yam (*D. aculeata*) are the leading cultivated species. In the Southern United States the name Yam is applied to a large variety of the sweet potato.

Yama, in Hindu mythology, the god of the dead, who judges and punishes souls.

Yamagata, town, Japan. It is an important shipping point for rice and other produce, and has silk filature mills. Six miles to the n.e. of the town stands a group of ancient Buddhist shrines; p. about 45,000.

Yancey, William Lowndes (1814-63), American legislator, orator, and Southern political leader, was born in Ogeeche Shoals, Ga. In 1848 he secured the adoption by the State Democratic convention of what is known as the 'Alabama Platform,' which asserted that the duty of Congress was not only to permit slavery in the new territory acquired from Mexico, but to protect it there. In January, 1861, he introduced the Ordinance of Secession in the Alabama convention, and delivered the address of welcome to Jefferson Davis on the arrival of the latter at Montgomery. Shortly before the Civil War broke out he went to Europe as head of a commission which made an

unsuccessful endeavor to secure the recognition of the Confederate government by the European Powers.

Yangtze or Yang-tse-kiang, longest, most important river of China, has its sources in the Tibetan plateau, 13,146 ft. above sea level. For some distance it forms the boundary between the provinces of Yunnan and Szechwan, then follows a winding course through Szechwan, Hupeh, Anhwei, and Kiangsu to the Yellow Sea. Its length is estimated at 3,500 m.; and its drainage area at 680,000 sq. m. On its banks are Nanking, Chinkiang, Hankow, Ngan-king, Ichang, Wuchang, and Chungking. It is of great commercial importance. Steam navigation is now successfully carried on as far as Chung-ching-fu, 400 m. farther upstream.

Yankee, in particular, the colloquial name for a person born or living in the New England States; in general, the popular name often applied by Europeans to any inhabitant of the United States. The generally accepted theory of its origin is that it is derived from *Yenghies* or *Yanghies*, an American Indian corruption of the word *English* or *Anglais*. It was in use in Boston about 1765, but circulated in Cambridge slang as early as 1713.

Yankee Doodle, a song, including many humorous verses, popular in pre-Revolutionary times, and generally considered one of the national airs of the United States. Both words and music are of English origin.

Yankton, city, South Dakota, county seat of Yankton co. Yankton College, a coeducational institution under Congregational control, is located here. It was settled in 1860, and until 1883 was the capital of Dakota; p. 6,798.

Yapon, or Yaupon, an evergreen shrub of the holly family, with smooth, oval leaves, small white flowers, and scarlet berries. It is native to the Southern United States, where it is popularly known as Cassena, Carolina Tea, and Appalachian Tea.

Yard, the common unit of linear measure in the United States and Great Britain. The yard contains standard measure of linear 3 ft., and each foot 12 inches. A square yard contains nine square feet, and a cubic yard twenty-seven cubic feet. A yard equals 91.4392 centimetres, a square yard 8361.13 square centimetres, and a cubic yard 764,535 cubic centimetres.

Yarkand, town, Eastern or Chinese Turkestan, Asia. It is the chief trading centre with Northern India across the Karakoram Pass. Saddlery, leather ware, carpets, and cotton,

woolen, and silk goods are manufactured; p. estimated at 100,000, mainly Mohammedans.

Yarmouth, or **Great Yarmouth**, seaport and watering place, Norfolk, England. The Church of St. Nicholas is ancient, and one of the largest in England. The 13th century rectorial of St. Nicholas Priory is now a school. Yarmouth is a centre of herring and other fisheries, and has a large fish-curing industry; p. 60,700.

Yarmouth, seaport town, Nova Scotia, Canada. The town has attractive surroundings, and is a summer resort. It is the chief shipbuilding centre in the province, and has a large trade in fisheries; p. about 7,000.

Yarns, fibrous materials from natural sources spun into threads, and used in the manufacture of textile fabrics, and for embroidery, knitting, etc. Various kinds are worsted, woolen, cotton, linen, silk, union.

Yarrow, Scottish stream that rises on the watershed between the counties of Peebles, Selkirk, and Dumfries, and flows to St. Mary's Loch.

Yates, Richard (1818-73), American executive, was born in Warsaw, Ky. During the Civil War he was governor of Illinois, and by checking pro-Southern sentiment in the State rendered valuable service to the Union cause.

Yates, Robert (1738-1801), American lawyer, was born in Schenectady, N. Y. In the period before the American Revolution he wrote a series of articles against the British government, under the signature 'Rough Hewer,' which attracted much attention. He was one of the committee that drafted the constitution of New York (1776).

Yaws, **Framboesia**, **Buba**, or **Tonga**, a contagious disease of the skin. It is epidemic, and is communicable by actual contact and by inoculation, as by flies. It is distinctly a tropical disease, depending for its origin on extreme heat and moisture.

Yazd. See **Yezd**.

Yazoo City, city, Mississippi, county seat of Yazoo co. It is a shipping point for cotton products, and has cotton-seed oil and cotton yarn mills, cotton compresses and lumber mills. During the Civil War the town was the site of a Confederate navy yard; p. 9,746.

Yazoo Frauds. In 1795 the legislature of Georgia passed an act granting certain lands to four associations, bearing the name of the Yazoo Companies, for \$500,000. Estimated at 20,000,000 acres, the grant was found to contain 35,000,000 acres. Great indignation was aroused by this concession, as practically all of

the members of the legislature were interested in the promoting companies. The concession was annulled the following year. The case was carried to the U. S. Supreme Court, which upheld the contention that since the original grant was in the nature of a contract, the legislature of 1796 acted *ultra vires* in annulling it. The lands were sold, and a sum of \$5,000,000 appropriated for the payment of claims by the land companies concerned.

Year, the period of the earth's revolution round the sun. Three kinds are distinguished—the Sidereal, the Anomalistic, and the Tropical. The *sidereal year* consists of 365 days, 6 hours, 9 minutes, 9 seconds. It strictly measures the time of one terrestrial circuit in space. The *anomalistic year*, or the interval between two successive passages of perihelion by the earth, is, by the progressive movement of the terrestrial line of apsides, rendered 4 1-2 minutes longer than the sidereal year, and comprises 365 days, 6 hours, 13 minutes, 48 seconds. It is used only in calculations of perturbative effects.

The *tropical year* is the year of civil life and of chronological reckoning. Its length, 365 days, 5 hours, 48 minutes, 45 1-2 seconds, is the lapse of time from one vernal equinox to the next. Its comparative shortness is caused by the precessional westward shift of the equinoctial point. Tropical years are divided into 12 calendar months, as follows: January, February, March, April, May, June, July, August, September, October, November, December.

Yeardley, or **Yardley**, **Sir George** (c. 1577-1627), colonial governor of Virginia, was born in London. He convened the House of Burgesses, the first legislature in America, on July 30, 1619.

Yeast, an organized ferment belonging to a class of fungi grouped botanically as 'budding fungi,' constituting the genus *Saccharomyces*, characterized by their faculty of causing alcoholic fermentation in saccharine solutions. There are many species—some very useful to the arts and industries, others valueless, and some even detrimental. Yeast is used in brewing, bread-baking, etc. The fermenting and raising powers of yeast are determined by the degree of intensity with which a given quantity of yeast is able to decompose a given quantity of sugar within a specified time. Compressed and dried yeast is now used as a valuable nitrogenous food. Yeast is also used, in the wet and dry conditions, as a medicinal agent—internally in intestinal disorders, externally in skin diseases. Its thera-

peutic action is mainly due to its content of enzymes.

Yeats, William Butler (1865-1939), Irish poet, born in Dublin. After three years of art study he devoted himself to writing, and has become the most distinguished representative of the contemporary Irish literary revival. In 1923 he was awarded the Nobel Prize for literature. In 1904 and 1911 he visited the United States, where he lectured at some of the principal universities. His *Wanderings of Ossin, and Other Poems* (1889), gave him a place as a poet of individual vision and individual music. Other volumes of poems are *Countess Cathleen* (1892); *Poems* (1895); and various plays of verse which have since been published in one volume, *Plays for an Irish Theatre* (1912). Among his other works are *Celtic Twilight* (1893); *Secret Rose* (1897); *The Tower* (1928); *The Winding Stair* (1929); *The Cat and the Moon* (1931). He has collaborated with Lady Gregory in *The Unicorn from the Stars* (1908).

Yecla, city, province Murcia, Spain. It is an ancient Roman and Arabic city, with many ruins. The neighboring region produces olive oil, wine, fruits, and cereals; p. 25,331.

Yeisk, port in Kuban province, North Caucasia, U. S. S. R., on eastern coast of Sea of Azov. Brick and pottery manufacture, wool washing, and tanning are the chief industries; p. 46,000.

Yelisavetpol, town, U. S. S. R. It has a citadel and a mosque, built about 1620 by Shah Abbas of Persia. It is noted for its grapes. The chief industry is textile manufacture; p. 56,000.

Yellow, the color between green and orange in the spectrum, its wave length varying from 0.590 to 0.580 micron.

Yellow Bird, a name given to the American goldfinch and to one of the warblers (*Dendroica aestiva*) usually distinguished as the 'summer' yellow bird.

Yellow Fever, a febrile disease endemic in the tropical and subtropical regions of Central and South America, in the West Indies, and in tropical West Africa. It has also appeared in epidemic form in the southern parts of the United States.

Yellow fever is characterized by jaundice and by hemorrhages, and is due to the action of a specific virus in the blood. A mosquito, the *Stegomyia fasciata*, is responsible for its conveyance from one victim to another. An energetic campaign against mosquitoes has resulted in the suppression of the disease wherever the campaign has been carried out

efficiently. The elimination of yellow fever from Havana in a single year after the discovery by Reed, Carroll, and Agramonte of the method of transmission is one of the most striking and spectacular triumphs of modern sanitation. Other countries have followed suit. In Mexico, for example, the scourge of centuries has been abolished by a vigorous anti-mosquito campaign.

Yellow-hammer, or **Yellow-bunting**, (*Emberiza citrinella*), a species of bunting common throughout Northern Europe. The length is about six and a half inches, and the general coloring mottled brown above and yellow below.

Yellowlegs, or **Tell-tale Snipe**, an American sportsman's name for two well-known snipe-like birds of the marshes and beaches. One is the greater yellowlegs (*Totanus melanoleucus*), 14 inches long, and the other the lesser (*T. flavipes*), 10 inches long.

Yellow River, **Hwang-ho**, or **Hoang-ho**, river of China, drains a basin of about 475,000 sq. m., and is estimated at about 2,500 m. long. It rises to the s. of the Shuga range, between Tsaidam and the Tangla range in Tibet. In 1887 a bad break in the dykes, causing destructive floods, was repaired before the river had permanently altered its course; another serious flood occurred in 1898. The river carries with it large amounts of the soft loess through which it flows, and is thus constantly lessening the depth of the Gulf of Pechili. It is this fine sand that makes the river water yellow.

Yellow Sea, or **Hwang-hai**, division of the Pacific Ocean, between Korea and China. It is nowhere more than 300 ft. deep. It is generally supposed to receive its name from the yellow mud which the Yellow, Yang-tse-Kiang, and other rivers carry down from the interior.

Yellowstone National Park, a tract of land originally comprising 3,575 sq. m. in Northwestern Wyoming, was set apart by act of Congress in 1872 as a national park to preserve from destructive molestation the most wonderful group of natural features and phenomena known within the boundaries of the United States.

The whole park plateau lies between 6,000 and 8,000 ft. above sea level. Mountains rise in great grandeur upon this plateau, giving evidence of their volcanic origin, by their form and their rock structure. Twenty-four peaks rise over 10,000 ft. The Continental Divide traverses the park, and from Two-Ocean Pond the waters may flow into either the Atlantic or the Pacific. The park has several

lakes, the largest being Yellowstone Lake, 7,741 ft. above sea level, 10 by 20 m. in average dimensions—the largest body of water at so great an elevation in the United States.

There are numerous falls and rapids. The Falls and Canyons of the Yellowstone are among the most wonderful in the world. The Canyon is cut more than 2,000 ft. deep into the lavas and sediments, exhibiting the most fantastic carvings of erosion ornamented by exquisite coloring. Into it plunges the river by two great leaps, the Upper and the Lower Falls, 112 and 310 ft. high respectively, thence flowing on as a narrow ribbon scarcely more than 200 ft. wide for 12 m. of this wonderfully beautiful chasm.

Yellowstone Park includes within its borders the largest geysers in the world. There are about 100 in all, included in six groups or geyser basins. Fifty geysers spout water and steam from 30 to 250 ft. into the air. Giant throws a 5-ft. column over 200 ft. high for an hour at intervals of about 6 days. Old Faithful, so named because of its regularity every 64 to 65 minutes, discharges a column 750 ft. high, amounting to 1,500,000 gallons of water at each eruption. There are also mud geysers, spouting and spattering thick black mud.

In the Mammoth Hot Springs area, near the northern boundary, where there are 50 active springs within a radius of 170 acres, there is a travertine accumulation of 1,000 ft. displayed in beautifully tinted terraces of incrustation. Nine-tenths of the whole area is forest, chiefly conifers. The tree limit varies from 9,400 to 9,700 ft. Few of the plateau localities are bare. Pipe, poplar, balsam, cedar, and spruce grow abundantly, many to large size. In the spring and geyser localities the trees are often covered by deposits, and buried. Whole forests have been thus entombed, and petrified trees are common. Deer, elk, buffalo, and bear may be approached near enough to photograph. Trout abound in the waters. Four varieties are found in the Five Hole alone.

Yellowstone River, the longest tributary of the Missouri, rises in the Shoshone Mountains of Northwestern Wyoming, flows through Yellowstone Park to the Upper Falls. From this point down the Grand Canyon of the Yellowstone are some of the most remarkable scenic effects produced by erosion to be found in America. The Upper Fall is 112 ft. high, the lower 310 ft. Then for a distance of 10 to 12 m. the canyon is cut from 600 to 1,500 ft. below the adjacent margins of the plateau. The Yellowstone traverses Montana and empties into the Missouri

River at Buford, on the boundary between that State and North Dakota. It is about 1,000 m. long. Its chief tributaries are from the s., among them Big Horn and Powder Rivers. Total drainage area, 69,683 sq. m.

Yemen. See *Arabia*.

Yen, a Japanese currency unit, with a standard weight of 11,574 grains of gold.

Yen, James Yang Ch'u (1894-), Chinese scholar, came to America and studied at Yale and Princeton. Supervised Chinese laborers, in World War I; invented basic Chinese vocabulary of 1,000 words; founded mass education movement, which revolutionized Chinese education.

Yenisei, river of Siberia, flowing into the Arctic Ocean. Its sources lie s. of the Sayan Mountains, in Northern Mongolia. After breaking through these it flows generally n., picks up the Upper Tunguska or Angara (1,060 m.), and after receiving the Stony Tunguska (990 m.) and the Lower Tunguska (2,200 m.), and spreading out to a great width, enters the Yenisei Gulf by a mouth 13 m. wide, after a course of 2,650 m. There are altogether 12,240 m. of navigable waterways in Lake Baikal and the Yenisei basin, of which 3,710 are utilized by steamers.

Yeniseisk, Krasnoyarsk district, Siberia, extending from the Sayan Mountains on the Chinese frontier n. to the Arctic Ocean, and from the Anabara River on the e. to the watershed between the Yenisei and Ob Rivers on the w. Iron, coal, salt, and asbestos are found. The inhabitants belong to the Samoyede, Yakut, Ostiak, and Tungus families. In the s. are the Buriat, Mongola. Area, 981,524 sq. m.; p. 745,300.

Yeniseisk, chief town, Krasnoyarsk dist., Siberia on the Yenisei River, 170 m. n.w. of Krasnoyarsk. The town has a meteorological station. There is trade in fish, skins, leather, and spirits. It was founded in 1618 by the Cossacks; p. 12,000.

Yeoman, a term used in England in the fifteenth and sixteenth centuries to describe a small freeholder. It was also given later to the 'forty shillings freeholder' by Parliament, and has been understood to signify the class which lies between the substantial farmer and the laborer. The term is also met with in the United States in old deeds and other legal documents.

Yeomanry, an irregular cavalry force in Great Britain, raised among men willing to provide their own horses, and officered chiefly by country gentlemen. The yeomanry is not liable to service abroad.

Yeomen of the Guard, an ancient body-guard of the British sovereign, first organized in 1485 by Henry VII. It is recruited from deserving old soldiers of distinguished service. Exclusive of officers, the corps numbers 100. Their duties are now purely ceremonial, as evidenced by their dress which has not changed in the main since Tudor times.

Yeovil, municipal borough, Somersetshire, England, on the Yeo River, 22 m. s. of Wells. St. John's, a handsome fourteenth-century church, is called 'the Lantern of the West.' The town is noted for the manufacture of gloves; p. 13,760.

Yerba de Maté. See **Maté Tea**.

Yerkes, Charles Tyson (1837-1905), American capitalist, was born in Philadelphia. In 1860 he secured a controlling interest in a Philadelphia street railway, and thereafter acquired large interests in New York, Chicago, and other lines. The problem of London (England) traffic also attracted him, and he became a large shareholder in the London underground lines and an advocate of their electrification. He presented a telescope, the largest refracting instrument in the world, to the University of Chicago, and erected the Yerkes Observatory.

Yerkes Observatory, the astronomical observatory of the University of Chicago, located at Williams Bay, Wis., was a gift to the institution from Charles T. Yerkes. It has the largest refracting telescope in the world, the object glass being 40 inches in diameter. The observatory, completed in 1897, has excellent equipment for research, and offers courses in astronomical spectroscopy, solar physics, celestial photometry, and related subjects.

Yerkes, Robert Mearns (1876-), psychobiologist, was born in Breadyville, Pa. From 1901-17 he was at Harvard University and from 1913-17 was also psychologist for the Psychopathic Hospital, Boston. From 1917-19 he was at the University of Minnesota, and since 1924 he has been at Yale University, serving, 1924-29, as professor of psychology, and since 1929, professor of psychobiology. Since 1931 he has been director of the laboratory of comparative psychobiology in the School of Medicine. He has published many papers, and his works include *Almost Human* (1925); *The Great Apes* (1929); and other books which are used as text books in the study of psychology.

Yew, a family (*Taxaceae*) of evergreen trees and shrubs, with purplish bark, spreading branches, linear, coriaceous leaves and scarlet, berry-like fruit. The wood, tough and

elastic, with a grain often as beautiful as mahogany, is used for bows, posts, and paddles. The yew is often cut into grotesque and geometrical forms for the adornment of gardens. The Common Yew (*Taxus baccata*), found usually in chalky soil in Europe, Asia, and Africa, has dark foliage, pale beneath. The Pacific Yew (*Taxus brevifolia*), which grows along the Pacific Coast of North America from Alaska to California, has foliage of a much brighter green than other species, and although rarely symmetrical, is a beautiful tree with its brilliant autumn berries. The Florida Yew (*Taxus floridana*) is a small, bushy tree of very dark foliage, found in Northwestern Florida. A sprawling shrub of the family, *Taxus minor*, grows in the Eastern United States, where it is commonly but incorrectly known as Ground Hemlock. The Japanese Yew (*T. cuspidata*), with bright red bark, is a great favorite in Japan.

Yezd, or **Yazd**, town, Central Iran, capital of the prov. of Yezd, is situated in the midst of the desert, 180 m. s.e. of Ispahan. Interesting buildings are the fort erected in 1137, and the Friday Mosque, dating from about 1119 A.D. There are manufactures of silk, cotton, copper, pottery, and felt, and deposits of antimony, nickel, and cobalt occur in the vicinity. The town is the seat of the Ghebers or Parsees; p. about 45,000.

Yezidis, or **Devil Worshipers**, a small and obscure religious sect, numbering about 300,000, found in the Caucasus, Armenia, and Kurdistan. The religion of the Yezidis, a syncretism to which Moslem, Christian, pagan, and Persian religions have contributed, comprises two fundamental beliefs: in a deity of the first degree, God; and in a deity of the second degree, composed of three persons in one, Melek Taous, Sheikh Adî, and Yezid. Melek Taous, the devil, is symbolized by the sanjak, a peacock with a swelling breast, small head, and widespread tail; the devil is never mentioned by name, any allusion to it being punished by death. Sheikh Adî is worshipped with elaborate ceremony as the great exponent of the Sacred Books (*Kitab al-Jilivah* and *Mashaf Rê*), and as a prophet sent by Melek Taous about 1200 A.D. to teach and warn the members of the sect. Yezid is regarded as the ancestral father but he is accorded no worship. The Yezidis observe the rites of circumcision, the Eucharist, and baptism; they fast but do not pray. They are an industrious people, engaging chiefly in agriculture and cattle raising. Consult Jackson's *Persia, Past and Present*; Joseph's *Devil Wor-*

ship, *The Sacred Books and Traditions of the Yezidis* (1919).

Yezo, or **Ezo**, spelled also **Yesso**, the most northerly of the main islands of Japan, now known as **Hokkaido**; formerly a part of the province of Hokkaido. It is separated from Honshu by Tsugaru Strait, and from Sakhalin by La Pérouse Strait. It covers an area of 36,289 sq. m., and is traversed from n. to s. by a central mountain chain, with some peaks from 4,000 to over 8,000 ft. The Ishikarigawa (400 m.) is the longest river in Japan. The climate is severe, and the flora and fauna are distinct from those of the main island. Fishing, lumbering, and mining are the chief industries, while agriculture, dairy farming, and sericulture are developing. Hokkaido furnishes more than one-half of the coal of the empire, the amount available having been estimated at 600,000,000 tons. Sulphur and petroleum are also found. The exports are coal, hard wood (chiefly oak), and railroad ties. Important cities are Sapporo, p. 171,900, the capital and seat of the Imperial University of Hokkaido; Hakodate, p. 176,166; and Otaru, p. 151,100, the largest seaports; Asahigawa, an agricultural and lumbering center; and Muroran, the center of the coal export trade. There are several villages of native Ainus, the most important being Piratori; p., with dependent islands, 2,359,997.

Yggdrasil, in Norse mythology, the mystical ash tree, which typifies existence. Its three roots stretch respectively into the realms of the gods, the giants, and death; its stem supports the earth; its boughs overspread the whole world, and reach beyond the heavens.

Yiddish, **Judisch**, or **Judeo-German**, a dialect spoken by the Jews in Eastern and Southern Europe and wherever emigrants from these regions have settled. It had its origin in the Jewish quarters of Germany in the Middle Ages, being at first basically a German dialect written in the Hebrew alphabet, and assumed its individuality and peculiar nature among the Jews of Poland, where Slavic influences assisted in molding the spoken language. Because of their segregation in separate quarters, the Jews were free to develop a vernacular of their own, and this speech they maintained in their migrations to other lands, in every instance adding words and expressions from the language of the country in which they settled.

Although efforts have been made among Jewish people to discard the somewhat form-

less language as a mere jargon, this tendency is being overruled by the growth of a large and varied literature in that tongue, comprising folklore, folksongs, poetry, allegories, dramas, essays, novels, tales, legends, and a large body of scientific translations. The second half of the nineteenth century produced a number of gifted Yiddish authors, among them Abramovitch (Mendele Mocher Seforim), author of *Die Khlatsch* (The Mare), *Das kleine Menschel* (The Mannikin), *Fischke des Krumer* (Fischke the Lame), and *Die Takse* (The Tax); I. J. Linetzki, author of *Das Polische Jüngerl* (The Polish Boy); I. L. Perez; N. M. Shaikewitsch (Shomer); Shalom Rabinowitsch (Shalom Aleichem); the poet Goldfaden, founder of the Yiddish theater; Jacob Gordin, a dramatic writer of exceptional talent; and Morris Rosenfeld, whose *Songs of the Ghetto* (1898) have been repeatedly translated.

Consult Wiener's *History of Yiddish Literature in the Nineteenth Century*; Goldblatt's *Yiddish*; Bourgeois' *Le Jargon*; Naschээр's *Buch des Judischen Jargons*.

Ying-tse. See **Newchwang**.

Ylang-Ylang (*Cananga odorata*), a large tree of the family Anonaceae, native of the Philippines and Java. From the flowers is obtained a valuable oil, the base of a perfume.

Yoakum, city, De Witt and Lavaca counties, Texas, on the San Antonio and Aransas Pass Railroad; 120 m. s.e. of San Antonio. Industrial establishments include a tannery and harness factory, marble yard, flour mill, ice factory, oil mill, cotton gins, broom factory, mattress factory, ice cream factories, bottling works, and a grist mill; p. 5,231.

Yochow, walled city, province of Hunan, China, on a canal 12 m. in length, connecting Tung-Ting Lake with the Yangtze River. It serves as the customs port of Western Hunan and principally of Changteh, with which there is steamer connection during the high-water season, but, since its site does not afford shelter for small vessels, the port and customhouse are established at Chenglin, five m. to the n. The city was only opened to foreign trade in 1900, yet the net trade in 1918 amounted to \$27,405,433; p. about 20,000.

Yodel. See **Jodel**.

Yoga, one of the six systems of Hindu philosophy, founded by Patanjali in the second century B.C., which like the Sankhya, of which it is a modification, assumes the existence of countless individual souls, and whose purpose is the attainment of knowledge which

will break the bonds entangling the Purusha (spirit) in the world of sense. Eight distinct stages must be passed through before the soul reaches its perfect union with the Supreme Lord: yama (self control), niyama (religious observances), āsana (appropriate postures), prāṇāyama (breath regulation), pratyāhāra (restraint of the senses), dhāraṇā (making the mind firm), dhyāna (meditation), and samādhi (deep contemplation). In the course of progress through these stages the Yogir acquires wonderful powers: he can make himself light or heavy; he can acquire a knowledge of the past or future; he can understand the language of animals; he can penetrate the thoughts of others; and he can remember all that has happened to him in former stages of existence. Such powers are attained only gradually, often requiring a succession of births, but their final attainment results in a complete liberation of the soul from the corporeal body. See PATANJALI.

Yokkaichi, city, island of Hondo, Japan, situated on Owari Bay; 23 m. s.w. of Nagoya, for which it is the port. The city has large cotton and weaving mills, as well as an important and varied trade; p. 40,393.

Yokohama, the chief treaty port of Japan, situated on Tokyo Bay on the southern coast of the island of Hondo; 18 m. s. of Tokyo. The harbor, protected by two breakwaters, 5,380 and 6,700 ft. long respectively, with an entrance between them 800 ft. wide and 33 ft. deep, affords safe anchorage to extensive mercantile shipping as well as to the naval squadrons of foreign countries. A number of canals crossed by numerous picturesque bridges wind through the city. The city proper consists of Kwan-nai, a district facing the harbor, behind it the larger district of Kwan-gwai, and Minami-Yamati or 'the Bluff,' a hilly district to the s. In the Kwan-nai are the Prefectural Government Office, the Post Office, Custom House, hotels and business houses; Kwan-gwai contains characteristic Japanese streets, theatres, shrines, and temples; while the Bluff is mostly occupied by the residences of Europeans and Americans. The well-to-do Japanese live chiefly in Noge-yama, a hilly district lying to the n.w. Places of interest include the Public Gardens, the Hundred Steps Tea House, the Buddhist Temple of Fudo, Cricket Ground, Race Course, and various temples, shrines, and native churches.

Yokohama is commercially important, more than half of the trade of the empire

being conducted through its port. As the great silk center, it exports practically all of the country's silk products. Other exports are cotton goods, drugs and chemicals, tea, sugar, porcelain, copper, lacquered ware, and machinery. Imports include rice, sugar, wheat and wheat flour, iron and steel manufactures, wool, paper, glass, tin, coal, and chemicals. Yokohama, previously a fishing village, in 1859 superseded Kanagawa, on the opposite side of the bay, as a treaty port. Fire in 1866 and earthquakes in 1870 did great damage; in 1886 a cholera epidemic killed nearly 2,200 people; in 1923 the city was almost completely destroyed by earthquake; 1945 almost destroyed by bombing; p. 951,189, according to 1950 census.

Yokosuka, naval station, situated at the entrance of Tokyo Bay on the s. coast of the island of Hondo, Japan; 12 m. s. of Yokohama, with which it is connected by rail. The city has a fine land locked harbor, and shipbuilding is an important industry. The tomb of Will Adams, the first Englishman who lived and died in Japan, and a monument, erected to him in 1910, are of interest; p. 96,351.

Yom Kippur, or the Day of Atonement. See JEWS, RELIGION OF.

Yonezawa, city, island of Hondo, Japan; about 25 m. s. of Yamagata, with which it is connected by rail. Places of interest are the ruins of an ancient castle, erected in 1238 by the Nagai family, and Sashisen Park, containing a small Buddhist temple and three Shinto shrines. The city is noted for the manufacture of rich silk fabrics known as Yonezawa-ori; p. 44,602.

Yongampo, town, Korea, on the Yalu River. In 1903 British and American representatives at Seoul urged the opening of Yongampo to foreign trade; but Russia, by agreement with Korea, obtained the town as a commercial port, and renamed it Port Nicholas. The opposition of Japan to this extension of Russian influence brought about the Russo-Japanese War.

Yonge, Charlotte Mary (1823-1901), English novelist, was born in Otterbourne, Hampshire, where the greater part of her life was spent. For many years she edited the *Monthly Packet* in which most of her stories appeared. Her works include *The Heir of Redclyffe* (1853), *The Daisy Cham* (1856), *The Dove in the Eagle's Nest* (1866), *Catherine of Aragon and the Sources of the English Reformation* (1881), *Life of Hannah More* (1888), *Life of the Prince Consort*

(1889), *Forget-Me-Not* (1900). She published in all 160 books which were widely read. See Christabel Coleridge's *Life of Charlotte M. Yonge*.

Yonkers, city, Westchester co., New York, on the eastern shore of the Hudson River, and on the New York Central and Hudson River Railroad; 16 m. n.e. of the New York City Hall. The northern half of the city is of great beauty, with its streets rising in a succession of terraces to an elevation of about 300 ft., and a wealth and variety of foliage. In the southeastern section, on a steep eminence, is the settlement known as Park Hill. The Philipse Manor House, formerly used as the City Hall, was erected toward the close of the seventeenth century. Notable buildings are the City Hall, Free Public Library, St. John's Hospital, St. Joseph's Hospital, Homeopathic Hospital, Leake and Watts Orphan Home, Hebrew Home for the Aged and Infirm, Greystone, the former home of Samuel J. Tilden, and the Masonic Guild, Knights of Columbus, and Elks Buildings. Educational institutions include the Spencian Business College, Hollywood Inn for Workingmen, the Woman's Institute Library, St. Joseph's Seminary, and Saunders Trade School.

Yonkers has large industrial interests, including the carpet and rug manufacturing plant of the Alexander Smith and Sons Company, the extensive works of the Otis Elevator Company, sugar refineries, grain elevators, coal yards, foundries and machine shops, and lumber mills. The first settlement was made about 1650, and was named from the manor house of Van der Donck, which was known as De Jonkheer's (young nobleman's). The town was organized in 1788, and the village incorporated in 1855. In 1872 the southern half of the town was separately incorporated as Kingsbridge, which in 1874 became a part of New York City; p. 152,798.

Yonne, department of North-central France, traversed by the Yonne River, and covering an area of 2,892 sq. m. Agriculture, forestry, mining, quarrying of building stone, vine growing, sugar refining, and glass making are carried on. The chief town is Auxerre; p. 304,000.

York, city and head of the northern archbishopric, Yorkshire, England, situated at the junction of the Foss and Ouse Rivers; 190 m. n.w. of London. The city was formerly surrounded by walls, the larger portion of which, with four ancient gateways or 'bars,' still remains. The Cathedral Church of St. Peter

was founded in the 7th century. The present building was begun by Archbishop Roger (1171) and continued by his successors till 1472. There are several other ancient churches and a modern Roman Catholic Cathedral. The archiepiscopal palace at Bishopthorpe, 3 m. s., is principally 17th and 18th century, with some vestiges of the earlier building. The castle at York was founded by William the Conqueror, but the present buildings are of various later dates. Manufactures include glass, confectionery, leather, fertilizers, railway carriages, and foundry products.

Caer Eborac, as York was originally named, was the capital of the Brigantes. By the Romans it was called *Eboracum*, and became their military headquarters, and the usual residence of the emperors when they visited Britain. Septimius Severus and Constantius Chlorus died there. In early times it was a center of Christianity. Saxon paganism subsequently obscured Christianity; but in 627 Edwin of Northumbria was baptized at York by Paulinus, who soon after became archbishop. In 1405 Archbishop Scrope was executed there and in 1557 Aske, leader of the 'Pilgrimage of Grace.' In 1644 it was besieged and taken by the parliamentary forces; p. 84,810.

York, town, Maine, York co., at the mouth of the York River, and on the Boston and Maine Railroad; 42 m. s.w. of Portland. The town includes several villages. It has a good harbor, and is visited as a summer resort. York Beach is 1½ m. distant. Features of interest are the Old Garrison House, erected about 1645, and a jail built in 1653, which is now a colonial museum. The town was set off in 1622 and incorporated two years later as Agamenticus. In 1642 it was chartered as the city of Georgeana, with a territory of 21 sq.m., and was the first English municipality established in North America. In 1649, on the death of Charles I., it formed a confederacy with Kittery, Wells, and the Isle of Shoals. This confederacy in 1652 was absorbed by Massachusetts, with the rest of Maine, and Georgeana was incorporated as the town of York, with its present boundaries. In 1602 half the inhabitants were killed or captured in an attack by the Indians; p. 2,000.

York, city, Nebraska, county seat of York co., on the Chicago, Burlington and Quincy, and the Chicago and North Western Railroads; 48 m. w. of Lincoln. Its leading institutions are York College (U. B.), Ursuline Convent, a National Children's Home, State Odd Fellows Home, the Nebraska State Wo-

man's Reformatory, and the City Library. The chief industrial establishments are flour mills, a foundry, and a brick plant. The first settlement here was made in 1871, and the place was incorporated in 1880; p. 6,178.

York, city, Pennsylvania, county seat of York co., on the Maryland and Pennsylvania, the Pennsylvania, and the Western Maryland Railroad; 96 m. w. of Philadelphia. The more prominent buildings include the City Hall, Federal Building, Court House, and Opera House. The York County Academy and the York Collegiate Institute are situated here, and the city has a hospital, an orphans' home, and a public library. York is an important manufacturing city. The first settlement at York was made in 1734, by a colony of Germans. John, Thomas, and William Penn laid out the town in 1741. During the Revolution the Continental Congress was in session here from Sept. 30, 1777, to June 27, 1778, when Philadelphia was in the possession of the English; p. 59,953.

York, town, South Carolina, county seat of York co., on two lines of the Southern Railroad; 68 m. n.w. of Columbia, the State capital. Manufactures include cotton, cottonseed oil, lumber, and monuments. The town was settled in 1774; p. 4,181.

York, Dukes of. See **York, House of**; also STEWART.

York, House of, played a prominent part in England in the 15th century. Edmund Langley (1341-1402), son of Edward III., was created Duke of York (1385). Of his two sons one was killed at Agincourt (1415), while the elder was beheaded in the same year. The latter's son was Richard, Duke of York, a statesman as well as a soldier, and the leader of the opposition to Queen Margaret, wife of Henry VI. of the House of Lancaster until he fell at the battle of Wakefield (1460). His eldest son ascended the throne: Edward IV., and his second son as Richard III. By marrying Elizabeth, daughter of Edward IV., Henry VII. united the families of Lancaster and York, and strengthened his own position. For some years, however, the descendants of Elizabeth and George, Duke of Clarence, the younger children of Richard, Duke of York, continued to be a source of alarm to the Tudor sovereigns. The dukedom of York is generally conferred on his second son by the king of England. Among others who have borne the title are Henry VIII., Charles I., James II., Cardinal York (son of the Old Pretender), and George V. See **ENGLAND, History**; **ROSES**, **WARS OF THE**.

York College, an institution of learning for both sexes at York, Neb., founded in 1890 under the control of the United Brethren in Christ. The college confers the degree of bachelor of arts, science, and didactics, and the degree of M.A. after three years of professional or literary work. The grounds and buildings are valued at \$68,000 and the income is about \$12,000. For recent statistics see Table of American Colleges and Universities under the heading **UNIVERSITY**.

Yorkshire, n.e. maritime co., the largest in England, divided for administrative purposes into Ridings—North, East and West—each constituting a separate administrative co. The total area of the county is 3,885,692 acres, of which 750,115 are in the East Riding; 1,362,058 North Riding; 1,773,529 West Riding. The coasts are generally regular, bordered by cliffs of moderate height. The surface is varied, mountainous in parts, with moorland in the n.w. and n.e. Yorkshire is an agricultural and grazing county. Coal, especially in the West Riding, iron ore, clay, limestone, and sandstone are extensively worked. There are manufactures of woollens (Leeds, Bradford, Halifax), cotton and worsted goods, carpets, silk, cutlery, armor plate and other heavy iron goods (Sheffield), and leather (Leeds); p. 2,030,702.

Yorktown, town, Virginia, county seat of York co., 72 m., by the old stage route, s.e. of Richmond, on the York River, and on the route of the Chesapeake S. S. Co. The oldest custom house in the United States is situated here, and the place is famous for Revolutionary and Civil War interest. In 1881 a centennial celebration of the victory over Cornwallis was held, and a monument dedicated; p. 384.

Yorktown (Virginia), Siege of. After the battle of Guilford Court House, Lord Cornwallis, in command of the British army, marched to Wilmington, N. C., and on April 25, 1781, started northward. He reached Petersburg, Va., May 20, and during the next two weeks attempted to capture Lafayette, who was in command of the small American forces for the defense of Virginia. Lafayette successfully evaded the British, and, June 10, was reinforced by Gen. Anthony Wayne with 1,000 infantry and six guns. Cornwallis turned toward the coast to await instructions from General Clinton in New York. He was ordered to fortify Old Point Comfort at the present Fortress Monroe, and if advisable, Yorktown, but neglected the former, which he deemed unsuitable. Meanwhile Washington

and Rochambeau, with the allied French and American forces, were at Dobbs Ferry, N. Y., menacing New York City and awaiting the arrival of the promised French fleet under Admiral de Grasse. That officer wrote that he expected to sail for Chesapeake Bay on Aug. 13, but that he would remain in American waters only a short time. Washington, who had heretofore resisted entreaties to remove the army from New York for operations in the South, determined to cooperate with Admiral de Grasse in an attack upon Cornwallis. With about 4,000 French and 2,000 Continentals he started across New Jersey Aug. 19, and by Sept. 26 had joined Lafayette and additional Virginia militia under Governor Nelson at Williamsburg. The French fleet, Sept. 5, defeated the British fleet under Admiral Graves and then held the Chesapeake to prevent British reinforcements. Washington took position before Yorktown Sept. 28, and the night of the 29th Cornwallis abandoned his outer works before the town.

Siege operations were directed by Baron Steuben and Oct. 9 the bombardment was begun. Fifty-two guns were in service on the 11th. Two outer redoubts which prevented the extension of the American lines to the York River were taken on the night of Oct. 14, one by an American column led by Lieut.-colonel Alexander Hamilton, the other by French troops under Colonel Deuxponts. A sortie from the British lines was repulsed the next day. Meanwhile the allied armies were closing in, and many of Cornwallis's guns were silenced. On the night of Oct. 16 he attempted to cross to Gloucester, on the opposite side of the river, but was prevented by a storm. Hope of reinforcements from New York had by this time been abandoned, and the morning of the 17th, the anniversary of the surrender of Burgoyne, negotiations for surrender were begun, which were completed the next day. On the afternoon of Oct. 19 the American and French troops were drawn up in parallel columns, between which the British and German soldiers marched. Cornwallis's sword, which he sent by General O'Hara, was received by General Lincoln, who had surrendered his at Charleston the year before. The besieging force numbered something more than 16,000. The American loss was 20 killed and 56 wounded; the French, 52 killed and 134 wounded. The British reported 156 killed and 326 wounded, while the prisoners numbered 7,247 soldiers and 840 seamen. The capture of these forces practically ended the war, although more than a year elapsed before

even a preliminary treaty of peace was concluded. Consult Johnston's *Yorktown Campaign and the surrender of Cornwallis*.

Yorktown (Virginia), **Civil War Operations at.** During the Civil War, when General McClellan began the Peninsular Campaign, April 4, 1862, he found Yorktown fortified and a line drawn from the town across the peninsula to the mouth of the Warwick River. Gen. J. B. Magruder in command of the Confederate forces had hardly more than 11,000 men in all, of whom perhaps 5,000 were at Yorktown. General McClellan, who very much over-estimated the Confederate forces, awaited reinforcements and began regular siege operations. At the end of the month McClellan had in position 115,000 men, while Gen. Joseph E. Johnston, who had assumed command of the Confederate forces on April 17, had only 50,000 on the peninsula. Just as McClellan was ready to open fire, General Johnston withdrew May 3. His rear-guard was overtaken near Williamsburg on May 5, and an indecisive battle was fought. Consult Johnson and Buel eds., *Battles and Leaders of the Civil War* (1888) and Webb's *The Peninsula* (1881).

Yorkville, tn., S. C., county seat of York co., 71 m. n. by w. of Columbia, on the Carol, and N. W. and the S. R. R.s. It has a carriage factory, three cotton mills, a cotton-seed oil mill, and a flour mill. Cotton, corn, wheat, and oats are raised in the region, and iron, gold, and corundum occur. Yorkville was settled in 1774 and incorporated in 1850. The town's present charter was granted in 1898; p. 3495.

Yorubas, a people occupying the country between Dahomey and the Niger, and parts of the lower Niger and Niger delta. They are negroes, but do not exhibit the physical characteristics of the race to so marked a degree as their neighbors on the west, and are superior in culture. The old Yoruba kingdom was broken up in 1820 by an invasion of the Mohammedan Fulahs, who captured the city of Ilorin. Under the influence of Mohammedan institutions, and in the south of Christian missionaries, the Yorubas have made great progress in the arts of civilization. They are still divided into a number of tribes, each under its own chief, and are collected in populous cities, of which the most famous is Abeokuta, the capital of the Egbas. Yoruba is now included in the British colony of Southern Nigeria.

Yosemite Park, a tract of land in Mariposa co., in the Sierra Nevada of California

which has been reserved from settlement and is to be maintained perpetually as a public park. The Yosemite Valley is a gorge, cut chiefly by glacial action. Five glaciers united at the head and gouged it out. What other forces may have aided in confining the action so completely to an excavation of the bottom of the cañon is not clear, but the result is a number of hung-up tributaries that now lead from the precipitous valley walls from prodigious heights. This characteristic development is not more than 7 m. in length, with an average width at the bottom of about half a mile and from cliff to cliff of a mile and a half. The features which distinguish it from all other known valleys are the almost vertical walls, their great height, the small amount of talus at the base, and the number of magnificent falls that occur in so small area. Its depth below the average marginal upland is from 2,800 to nearly 5,000 ft. The cliffs and domes that form the most prominent features of the walls are of solid granite. El Capitan (7,630 ft.) and Half Dome (6,927 ft.) are the most striking in appearance, rising with almost vertical walls 3,300 and 4,700 ft. respectively from the valley floor.

The Merced River flows through the valley. The Illilouet and Tenaya are tributary to it near the entrance to the main valley, and the three in three separate cañons have many attractive features of their own. The country surrounding the valley and constituting the National Park is a rolling and hilly region varying from 8,000 to 10,000 ft. above sea-level. There is little soil or vegetation except a scattered forest growth. Small glaciers still remain near the summits of some of the adjacent mountains. Bare granite peaks rise still higher from this surface, while in the valleys, where a better soil and more constant water prevails, vegetation is more varied and luxuriant.

Youmans, Edward Livingston (1821-87), American scientist, born at Coeymans, N. Y. He devoted much time to chemistry, and in 1872 he founded the *Popular Science Monthly*, which he edited until his death. He planned the 'International Scientific Series.'

Youmans, William Jay (1838-1901), American scientist, brother of Edward L. Youmans, born in Milton, N. Y. He studied chemistry in Columbia and Yale Universities, graduated from the medical department of New York University in 1865, and studied biology under Professor Thomas H. Huxley. In 1868-71 he practiced medicine in Minnesota, and in 1872 joined the editorial

staff of the *Popular Science Monthly*, which he edited in 1887-1901. He was author of: *Pioneers of Science in America* (1895), and edited the American edition of Huxley's *Lectures in Elementary Physiology*.

Young, Arthur (1741-1820), English agricultural author, born in London, lived chiefly at Bradfield Hall in Suffolk. The result of tours, undertaken with a view of studying agricultural methods, appeared in a series of books. In 1791 Young began a correspondence with Washington and Lafayette, and with other celebrated men. His letters from Washington were published in 1803 in Alexandria. Among his writings were *The Theatre of the Present War in North America* (1758), and a novel, *The Fair American*. In 1792-4 appeared Young's *Travels in France*, the record of journeys undertaken from 1787 to 1790, in which he added acute observation of political and social conditions to his investigation of the state of agriculture. Young was also editor of, and a frequent contributor to, a monthly periodical, *Annals of Agriculture*. His publications gave a decided impulse to the scientific study of agriculture, previously almost unknown in England.

Young, Brigham (1801-77), second president of the Mormon Church, and founder of Utah, born in Whittingham, Vt. He worked for a time as a carpenter and painter, and in 1829 moved to Meridian, N. Y., where in 1832 he was converted to Mormonism. In the same year he was ordained an elder, and after joining Joseph Smith at Kirtland, O., was sent on a missionary tour to Canada. In 1835 he became one of the 12 apostles. When Thomas Marsh became an apostate, and Smith was imprisoned by the authorities of Mo., Young directed the removal of the Mormons to Illinois, where they founded the town of Nauvoo. In 1840 he was chosen president of the apostles. He assisted Parley Pratt in conducting a publication known as the *Millennial Star*, and after the death of Smith defeated Sidney Rigdon in the contest for the headship of the church. When the Mormons were driven from Illinois, he led the emigration to the valley of Great Salt Lake, and there, in July, 1847, founded Salt Lake City, and in 1849 organized the state of Deseret. Soon afterwards he was formally chosen first president of the church, and in 1850 was appointed governor of Utah, the name Deseret being discarded. In 1852 he announced a divine revelation on 'celestial marriage,' or, in other words, polygamy, and claimed that this revelation had been given to Smith in

1843. This Smith's widow and sons denied, and a split occurred in the church, one of Smith's sons becoming the leader of the seceders. The Mormons about the same time adopted a violent attitude toward the Government authorities, and in 1856 a mob of Mormons broke into the U. S. district court room, and compelled the court to adjourn.

Moved by these and other acts of violence, President Buchanan appointed Alfred Cummings governor, and in 1857 sent troops to restore order. An armed conflict appeared for a time to be inevitable, but ultimately the Mormons submitted and were pardoned. Brigham Young was active in promoting agriculture, founded the University of Deseret and other schools, took a prominent part in the construction of the Utah Central and other railroads, and was the prime mover in the building of the celebrated Mormon Temple. He practiced the doctrine of polygamy that he preached. When he died he left valuable property, a number of widows, and 57 children. See MORMON, BOOK OF; MORMON CHURCH.

Young, Charles Augustus (1834-1908), American astronomer, was born in Hanover, N. H. He was graduated from Dartmouth College (1853) and from 1857 to 1866 was professor of natural philosophy and mathematics in Western Reserve College, Ohio; from 1866 to 1877 professor of astronomy and natural philosophy at Dartmouth; and from 1877 to 1905 filled a similar chair at Princeton. He was a member of various important astronomical expeditions, was the discoverer of the 'reversing layer' of the solar atmosphere, and made the first observations on the spectrum of the sun's corona. In addition to many scientific text books he wrote *The Sun* (1882); *Lessons in Astronomy* (1891); *General Astronomy* (1898); *Manual of Astronomy* (1902).

Young, Edward (1683-1765), English poet, was born in Upham, near Winchester. In 1708 he was appointed to a law fellowship at All Souls, Oxford. In 1719 his tragedy *Busiris* was produced at Drury Lane; and was followed in 1721 by another tragedy, *The Revenge*. In 1728 he became a clergyman, and was appointed chaplain to George II. He held the living of Welwyn (Herts) till his death. His greatest poem, *The Complaint, or Night Thoughts on Life, Death, and Immortality* (1742), was begun in 1741 and completed in 1744. The diction is often fine, but sometimes exaggerated; often pointed, but sometimes marred by false antithesis. Other

works include a collection of satires—*Love of Fame the Universal Passion* (1728); *Ocean: an Ode; The Instalment*.

Young, Ella Flagg (1845-1918), American educator, was born in Buffalo, N. Y. She was educated at the Chicago Normal School and in 1868 was married to William Young. In 1887 she was appointed a district superintendent of the Chicago city schools; in 1899-1905 was professor of education at the University of Chicago, receiving the degree of PH.D. from that institution in 1900. In 1905 she became principal of the Chicago Normal School; and in 1909 superintendent of public schools of Chicago, resigning in 1915. In 1910-11 she was president of the National Education Association. She published *Isolation in the School* (1901); *Ethics in the School* (1902); *Some Types of Modern Educational Theory* (1902).

Young, James (1811-83), Scottish chemist, inventor of a successful method of paraffin manufacture, was born in Glasgow. He became assistant to Professor Graham in that city (1831-2), and subsequently (1837) at University College, London. His invention laid the foundation of a world wide paraffin industry. He was a friend of Livingstone, to defray the cost of whose explorations he contributed liberally. See PARAFFIN.

Young, Sir John (1807-76), British administrator, was born in Bombay, India, and was educated at Oxford. From 1831 to 1855 he was a member of Parliament; in 1841 became a lord of the Treasury; in 1852 chief secretary for Ireland; in 1855 lord high commissioner of the Ionian Islands. From 1861 to 1867 he served as governor-general of New South Wales, and from 1869 to 1872 as governor-general of Canada. In this office he suppressed the first rebellion of Louis Riel, for which he was made Baron Lisgar.

Young, John Russell (1841-99), American journalist, was born in Downington, Pa. During the Civil War he acted as a war correspondent, and was afterward managing editor of the New York *Tribune* (1866-9), and in 1870 founded the New York *Standard*. In 1872 he became foreign correspondent of the New York *Herald*, and in 1877 accompanied General Grant on his trip around the world. He was U. S. minister to China for three years (1882-5), and in 1897 was appointed librarian at Washington. He wrote *Around the World with General Grant* (1879).

Young, Lucien (1852-1912), American naval official, was born in Lexington, Ky., and was graduated from the Naval Academy in

1873. In 1877, when the *Huron* was wrecked near Cape Hatteras, N. C., he rescued a number of the crew, for which he received a gold medal and other honors. After serving on various ships and in the Bureau of Equipment, he was an instructor in the Naval War College. He served with distinction in the Spanish-American War; was commander of the *Bennington* when it was wrecked by a boiler explosion and beached at San Diego, Cal., in 1905; and was captain of the *Mare Island* Navy Yard at the time of the San Francisco earthquake, receiving the commendation of the Secretary of the Navy for his part in relief work. In 1910 he became rear admiral. He published *Simple Elements of Navigation* (2d ed. 1898); *The Real Hawaii* (1899).

Young, Owen D. (1874-), American lawyer, was born in Van Hornesville, N. Y. He was graduated from St. Lawrence University, Canton, N. Y., in 1894, and from Boston University Law School in 1896. In the same year he took up practice of law in Boston. He was chairman of the Board of the General



Owen D. Young.

Electric Co. (retired 1939) and Class C Director and Deputy Chairman of the Board, Federal Reserve Bank of N. Y., and director of several important concerns. He has been decorated by many European countries. He was a member of the First Committee of Experts appointed by the Reparations Commission in 1923, Agent General for Reparations *ad interim*, 1924, and chairman of the Second Committee of Experts which met in 1929. The Young Plan, which was adopted at that time, replaced the Dawes Plan. See Ida Tarbell's *Owen D. Young* (1932). (See REPARATIONS.) He has played a distinguished part in international affairs, in recognition of which he has received the Cross of the Com-

mander of the Legion of Honor, as well as other decorations.

Young, Samuel Baldwin Marks (1840-1924), American soldier, was born in Pittsburgh, Pa. He served throughout the Civil War, attaining the rank of brevet brigadier general. He entered the regular army in 1866 and became a colonel in 1897. During the Spanish-American War he held important commands in Cuba; served in the Philippines (1899-1901); was appointed major-general U. S. A. (1901); commanded the Department of California (1901-2); became president of the new War College Board (1902); and was made lieutenant general (1903). In 1903 he became the first chief of staff, retiring the next year.

Young, Thomas (1773-1829), English physicist and Egyptologist, was born in Milverton, Somersetshire. He studied medicine in London, and in Göttingen and in 1799 settled in London, in 1801-03 serving as professor of physics at the Royal Institution. Young is best known for his researches in optics. He discovered the interference of light, thereby establishing the undulatory theory; but the theory was not generally accepted until re-advanced by Fresnel. He also advanced the theory of the accommodation of vision and of astigmatism. His *Course of Lectures on Natural Philosophy* (1807) remains a standard work. In Egyptology he was one of the first to publish a translation of the inscriptions on the Rosetta stone, and to discover the symbolic nature of some of the demotic characters.

Young England, the epithet applied to a party of young Tory aristocrats opposed to the repeal of the Corn Laws and to other Radical measures (1839-46). They also aimed at a revival of the manners and customs of mediæval times. Lord John Manners (7th Duke of Rutland, 1818-1906), Cochrane Bailie, G. Smythe, and Benjamin Disraeli were leaders of the movement, which is illustrated in Disraeli's novel *Coningsby* (1844).

Young Europe, an international association of republican societies in various countries, formed about 1834, comprising such groups as Young Germany, Young Italy, Young Poland, Young France.

Young Germany, a school of letters organized in Germany after its emancipation from the rule of the first Napoleon. It endeavored to reflect the political hopes and aspirations resulting from the spread of liberal ideas throughout Europe. The failure of the revolution of 1848 caused the dismemberment

of the organization. Among its chief exponents were Heine, Börne, Gutzkow, Laube, Heller, and Kühne.

Younghusband, Sir Francis Edward (1863-1942), British colonial official, was born in Murree, India. In 1886 he traveled in Manchuria, and returned to India across Eastern Turkestan. After serving as British political agent at various posts in India, in 1903 he was appointed the British commissioner for negotiating with China a settlement of the relations between India and Tibet, and was at the head of the expedition which in the following year forced its way to Lhasa. In 1906-09 he was British resident at Kashmir. He is the author of *The Relief of Chitral* (1895); *The Heart of a Continent* (1896); *South Africa of To-day* (1898); *Kashmir* (1909); *India and Tibet Within* (1912); *The Heart of Nature* (1921); *The Gleam* (1923).

Young Ireland, the name given to a political party in Ireland, founded in 1848 by Thomas Osborne Davis, C. Gavan Duffy, Thomas Davies, and W. Smith O'Brien, with the object of uniting Roman Catholics and Protestants in a supreme effort to separate Ireland from the British crown.

Young Italy, a political association formed at Marseilles in 1831 by Mazzini, the Italian agitator and patriot. It aimed at the creation of a free, independent, and united Italy, under a representative form of government. It ceased to be an active organization after 1848.

Young Men's Christian Association, a voluntary organization of world-wide scope, designed to promote the spiritual, social, intellectual, and physical welfare of young men. The movement originated in Great Britain with Sir George Williams, through whose efforts the first Young Men's Christian Association was organized on June 6, 1844, for the purpose of establishing religious services and Bible classes among young men employed in business in London. By 1851 seven additional associations had been established in London and 16 in other parts of the United Kingdom, all of which were affiliated with the original body.

Knowledge of the work came to America in the fall of 1851, and the first two American associations were founded in that year in Montreal (Dec. 9) and Boston (Dec. 29). From these points the movement spread to other cities, and in June, 1854, 19 organizations were represented at the first convention of North American associations, at Buffalo, N. Y. At this meeting an alliance of the as-

sociations of the United States and Canada was established, under the supervision of an international executive or central committee (since 1870-9 known as the International Committee), which was instructed to call annual conventions and, as an advisory, supervisory agency without authority over the local Associations, to do everything in its power to foster and extend the work.

The Young Men's Christian Associations of the United States and Canada are affiliated under the general direction of the *International Committee for North America*, elected at triennial conventions, and exercising general supervision over the associations, as well as special direction of a foreign work reaching strategic centers of Asia, South America, and Africa. This supervision without authority over the local organizations is reinforced by 36 State committees, and for Canada by a National Council. Not until 1871, when the building movement had begun to accommodate with equipment the fourfold work, did the employed officers of various names begin to meet annually, adopting the name of General Secretary. Then the men in this new vocation were less than a score in number. They now number more than 5,200. The study of this growth and of the personalities enlisting for life in the work reveals the strongest factor contributing to its efficiency and world extension.

In 1940, the annual report showed 10,381 local associations, 1,600,000 members with additional participants totaling 1,500,000; 5,300 full-time secretaries in 36 different nations.

When the United States entered World War I, the Y. M. C. A. was officially designated to minister to the physical, social, and moral needs of the men in the armies; a National War Work Council was organized in April, 1917; a preliminary fund of \$5,000,000 was raised; and the erection of Y. M. C. A. buildings in army camps throughout the country was undertaken. In November, 1917, an eight-days' campaign was conducted to raise \$35,000,000 to finance war work both at home and abroad, and a total of over \$54,000,000 was pledged for the purpose. Another campaign undertaken by the United War Work Council resulted in the addition of \$100,759,000 to the funds of the Y. M. C. A. and an additional \$551,628 from miscellaneous sources also swelled the treasury. A total of \$161,722,649 was received from April 26, 1917, to Dec. 31, 1919, and \$38,809,642 was expended on American soldiers, sailors, and

marines in the United States, and \$52,382,736 on soldiers and marines overseas.

In World War II the Y. M. C. A. joined the United Service Organizations.

The first association among *colored men* was established in 1853 in Washington, D. C., and the first *Indian association* was organized among the Sioux in 1879. A special mission is also carried on in the *Panama Canal Zone*, where club houses have been erected by the Government for the purpose. Work among *boys* was begun in 1869 with the organization of a boys' department at Salem, Mass.; a boys' secretary was added to the staff of the International Committee in 1900; and this branch of work is now recognized as an integral part of Y. M. C. A. effort.

In order to meet the demand for trained workers in all these lines of endeavor, two training schools are maintained—the International Y. M. C. A. College in Springfield, Mass. (1885), and the Association College of Young Men's Christian Associations in Chicago (1890). Other training agencies are the summer schools at Silver Bay, Lake Geneva, Blue Ridge, Asilomar, Lake Couchiching, Ont., Estes Park, and elsewhere, and training center classes in 40 of the larger associations. The following association periodicals are published by the International Committee: *Association Men*, *Railroad Association Magazine*, *Rural Manhood*, *Foreign Mail*, *American Youth*, and *The Student Edition of Association Men*.

Statistics.—In the year 1945, fully organized associations in North America numbered 1,323 (United States, 1,244), with 3,755 employed officers, and a reported membership of 1,250,177 (United States 1,200,777), of whom 400,000 were active members. The total value of the property and funds paid in was \$128,019,010; the annual income was \$36,807,962, and the annual current and operating expenses \$38,484,816. The educational class instruction reached 107,015 persons; Bible and training classes counted a membership of 136,255, and all religious meetings an attendance of 8,142,677. The number in gymnasium classes was 308,981. Work for boys was carried on in 948 associations, which included as members 199,615 boys.

The association and membership were divided as follows: city associations 765, membership 649,559; county associations 342, membership 7,533; railroad associations 244, membership 111,652; student associations (exclusive of colored and Indian schools) 638, membership 73,530; colored men's as-

sociations 162, membership 25,925; other associations 26, membership 693. There were in addition 17 army and navy associations.

The International Committee is the principal agency of international cooperation between the 36 national associations. The committee maintains permanent secretaries in 33 countries. The Y. M. C. A. operates many colleges specializing in evening adult ed. One of its larger ed. institutions is Northeastern Univ., Boston, with over 5,000 students. Overall membshp., 1952, 3,500,000.

Young People's Society of Christian Endeavor. See *Christian Endeavor*.

Youngstown, city, Ohio, county seat of Mahoning co., on the Mahoning River, and the New York Central, the Baltimore and Ohio, the Erie, the Pennsylvania, the Pittsburgh and Lake Erie, and the Lake Erie and Eastern Railroads; 67 m. s.e. of Cleveland, and 66 m. s.w. of Pittsburgh, Pa. It is situated on both banks of the river, and extends to the higher land on the n. and w. Mill Creek Park embraces 485 acres, on both sides of the river, beyond the city limits; other parks are Wick, Crandall, Lincoln, South Side, Pine Hollow, and Dewey, their combined area being 186 acres. Among the more important institutions and buildings are the Federal Building, County Court House, City and St. Elizabeth Hospitals, Reuben McMillan Free Library, Rayen High School, South High School, Y. M. C. A. and Y. W. C. A. Buildings, Children's and Old Ladies' Homes, Butler Art Institute, and the Wick, Mahoning, Stambaugh, Home Savings and Loan, and Dollar Bank Buildings.

Youngstown is the center of the second largest group of iron and steel industries in the United States, and the production of steel and iron works and rolling mills represents about 60 per cent. of the manufactures of the city, the chief products being rails, pipe, sheets, plates, bars, rods, wire and wire products, tinplate conduit, and electrical cable. Other important industries are the manufacture of automobile trucks, brass, cement, flour, gas mantles, electric bulbs, leather, powder, wagons, and bronze castings, as well as mill work. Iron ore and bituminous coal occur in the district. Youngstown was named for John Young, who purchased the township from the Connecticut Land Company in 1796; p. 167,720.

Young Turk Party. See *Turkey, History*.

Young Women's Christian Association, an interdenominational organization to

promote the spiritual, mental, and social life, and improve the physical and economic condition of young women in all parts of the world.

There are Y. W. C. A.'s in 52 countries affiliated with the World's Council of the Y. W. C. A. in Geneva, Switzerland. In 1937, the membership in the United States was 465,000. The annual operating expenses amounted to \$979,279. There were 3,128 secretaries.

Ypres (Flemish *Yperen*), ancient town, Belgium, in the province of West Flanders; 32 m. by rail s.w. of Bruges. Previous to the Great War it had manufactures of lace, linen, and thread, and a large butter market. The Cloth Hall and St. Martin's Church (formerly a cathedral) both dated from the 13th century. Ypres was a flourishing linen-manufacturing town in the 14th and 15th centuries. The city was wholly destroyed in the Great War (1914-8); p. 20,420. See EUROPE, WORLD WAR I.

Ypres, Battles of. The numerous battles which took place in World War I within artillery range of Ypres destroyed it utterly. When the Germans fell back from the Marne they occupied it for a few days, but in the latter part of October, 1914, they withdrew their defensive line to the high ground about five miles east of the city. As soon as their new position was perfected and their right heavily reinforced, they began a fierce attack on the Allied left in an attempt to reach Calais and the French ports on the Channel. The fighting around Ypres was exceedingly intense. The British were able to hold the town, though it was reduced to ruins by shell fire. These operations in October and November of 1914 are commonly called the First Battle of Ypres.

Ypsilanti, city, Michigan, in Washtenaw co., on the Huron River, and on the Lake Shore and Michigan Southern and the Michigan Central Railroads; 30 m. s.w. of Detroit. Michigan State Normal College and Cleary College are situated here. There is excellent water power, and the industries include a creamery, planing mills, paper, agricultural implements and flour-mill machinery, veneers, iron and cement products, reed furniture, and pressed steel. There are mineral springs in the vicinity; p. (1900) 7,378; (1940) 12,121; (1950) 18,302.

Ysaye, Eugène (1858-1931), Belgian violinist, was born in Liège. He received his first lessons in violin playing from his father, and subsequently studied under

Wieniawski and Vieuxtemps at Brussels. For the past fifty years his name has been familiar to the concert-going public, and he has made several round-the-world tours. He has held various important appointments, including that of professor of violin in the Brussels Conservatory (1886-98). In 1894, 1905, 1913 and 1917 he visited the United States. He spent the years 1914-18 in England and later returned to Belgium and resumed the *Concerts Ysaye*, founded in 1895. Ysaye possessed extraordinary temperamental gifts, and was one of the great exponents of classical and virtuosic violin music. He has written a number of violin concertos and mazurkas.

Ysopet ('little Aesop'), in the Middle Ages the title of a collection of old French fables. The chief of these was that of Marie de France, who lived in England in the reign of Henry III.

Ystad, seaport town, Malmöhus government, Sweden; 34 m. s.e. of Malmö. It has flour, saw, and sugar mills, iron foundries, tobacco, bacon, match, and chicory factories, and chemical works; p. 11,444.

Ytterbium, a metal occurring in combination with yttrium and similar elements in such rare minerals as monazite, euxenite, and gadolinite. First obtained by Marignac in 1878, it was considered a distinct element until Urbain in 1907 demonstrated it to be composed of *neo-ytterbium* and *lutecium*.

Yttrium (Y, atomic weight 89), a trivalent metallic element (sp. gr. 3.8) of the rare earths, found in gadolinite and other minerals in combination with ytterbium, erbium, terbium, etc., which are accordingly known as the yttrium group. It is a blackish gray powder characterized by its spark and phosphorescent spectrum.

Yuan Shih-kai (Shi Kai) (1859-1916), president of the republic of China, was born in Honan province, of middle class parents, his father being an army officer. He adopted the military profession, and in 1882 accompanied the Chinese forces which were despatched to Korea to assist the king in quelling an insurrection. He remained in that country as imperial resident until the Chinese were expelled as a result of the war with Japan (1894-5). In 1899 he was made governor of Shantung, where his vigorous measures against the Boxers saved many European lives in Peking, and helped to preserve the government. In 1901 he became governor of Chili, on the death of Li Hung Chang. As commander-in-chief of the army and navy (1903) he completely reorganized

the service along modern lines. In 1907 he was appointed grand councillor, and in 1908 became senior guardian of the heir-apparent. In 1908, however, in spite of the growing favor with which he was regarded by the Empress Dowager, his opponents succeeded in forcing his retirement and practical banishment.

On the outbreak of the rebellion in October, 1911, Yuan was recalled by Prince Chun to become generalissimo of the imperial forces. On Nov. 8 he was elected premier by the National Assembly. After the armistice of Nov. 30 he conducted the negotiations with the revolutionists which resulted in the peaceful abdication of the Emperor (Feb. 12, 1912), and the establishment of a republic; and on Feb. 15 he was unanimously elected provisional president by the Assembly of China. He vigorously suppressed a number of uprisings, and successfully disposed of serious dissensions in the government.

On Oct. 6, 1913, Yuan was elected President of the Chinese republic for a term of five years by a two-thirds majority of the Chinese Assembly. In December, 1915, he had himself proclaimed emperor of China. This proclamation caused serious dissensions throughout the country, and Yuan afterward declined to accept the throne, remaining the head of the republic. See CHINA, *History*.

Yucatan, peninsula of Central America, jutting north into the Gulf of Mexico, and dividing it from the Caribbean Sea. It includes the Mexican states of Campeche and Yucatan and territory of Quintana Roo, as well as parts of British Honduras and Guatemala. With an average breadth of about 200 m., it stretches 400 m. n. and s. Total area, 55,000 sq. m. Yucatan is a flat expanse of coral formation, ridged toward the east by a low chain of hills. The interior is overspread with forests of mahogany, rosewood, and other valuable timber, while the south and east are fertile with cotton, rice, maize, tobacco, indigo, coffee, beans, and henequen.

Ruins at Uxmal, Chichen, Izamal, and Mayapan consisting of temples and other vast edifices, richly carved and colored, testify to an ancient civilization. At the time of its discovery Yucatan was the chief seat of the Maya Indians.

Yucatan, a state of Mexico, in the northern part of the peninsula of Yucatan, bounded by the Gulf of Mexico on the n. and w., Quintana Roo on the e. and s., and Campeche on the s.w. The climate is hot, though

tempered by ocean breezes, varying between 89° F. and 66° F. The forests yield precious woods, dyewoods, and chicle; marble, coal, and salt are found. The northern portion is devoted almost entirely to the culture of henequen for sisal fibre; in the northwestern part there are large plantations producing sugar and tobacco. Sugar, sisal, dye and cabinet woods, chicle gum, tobacco, and vanilla are exported. Railroads connect Progreso, the chief port, with Merida, the capital, with the interior, and with Campeche; p. 358,221.

Yucatan was constituted a state in 1824. Campeche was made a separate state in 1858, and Quintana Roo a territory in 1904.

Yugoslavia, republic in southeastern Europe, including the former kingdoms of Serbia and Montenegro, and the Austro-Hungarian provinces of Bosnia and Herzegovina, Dalmatia, Croatia, and Slovenia. It has a total area of 96,134 sq. m., and is bounded on the n. by Austria and Hungary, on the w. by Rumania and Bulgaria, on the s. by Greece, and on the w. by Italy, the Adriatic Sea, and Albania; p. 16,200,000. The chief industries are agriculture and lumbering. The Serb-Croat-Slovene State was established in 1918 by the union of Serbia and the provinces which had declared their independence of Austria. Montenegro entered the new state in 1921. A constitution was adopted June 28, 1921, providing for a monarchical form of government, with a national assembly consisting of a single chamber, whose members were elected for a term of four years. On Nov. 6, 1921, Alexander I., son of Peter I. of Serbia, became king. He was assassinated, 1934, and succeeded by his young son, Peter II., whose duties, until he became of age, were assumed by three Regents.

Under the new constitution the old provincial organizations—Serbia, Montenegro, Croatia, Bosnia, Herzegovina, Slovenia, etc.—were abolished, and the country was divided into 23 departments, each under a prefect appointed by the central government. This centralized form of government met with considerable opposition, especially among the Croats. Their leader, Stefan Raditch, and others were shot down in the Chamber of Deputies. In 1929, King Alexander established a dictatorship which terminated, Sept. 3, 1931, when he promulgated a new constitution. The capital is Belgrade; other cities are Sarajevo, Dubrovnik. The establishment of the boundaries of the Kingdom of the Serbs, Croats and Slovenes was a matter of some difficulty. Whole sections of Hun-

garian population were involved. (See HUNGARY.)

In December, 1934, the government announced that 10% of the Hungarians in Yugoslavia had been asked to leave since they had not become naturalized. In 1941 the country was invaded by the Germans. Following the invasion it was partitioned among Germans, Italians, Hungarians and Bulgarians; but during 1942 and 1943 it fought on through guerrilla movements. In 1942 civil warfare between rival anti-Axis factions broke out, and by 1943 conflict between pro-British and pro-Soviet elements. Soon after the conclusion of the war (1945) a republic was established by popular vote.

Yukaghirs, Siberian aborigines, a division of the Mongolic family. They are now reduced to less than 1,000, centered chiefly between the Indigirka and Yana basins.

Yukon, a territory of Canada, with an area of 206,427 sq. m., formed in 1898, out of the Northwest Territories, for the purpose of administering the gold regions of the Yukon. It reaches from the British Columbia border to the Arctic Ocean, and lies between Alaska on the w. and the Northwest Territories on the e. The surface is in general a plateau 2,000 to 3,000 feet above the sea, on which rise numerous ranges of hills and mountains. The eastern boundary follows the continental divide. Mount Logan, near Mount St. Elias, on the extreme western border, is the highest mountain. The climate in winter is very cold; in summer, very hot at times.

Very little is known about the soil; but wheat has ripened, and the hardier vegetables and plants have been successfully grown in the southern part of the Territory, and at Dawson. Mining is the territory's mainstay, the principal mineral obtained being gold, first discovered in 1896. All the best claims are situated at or near the Klondike River. The original placer mining of the 'boom' period has given way to the use of powerful hydraulic dredges. Coal, copper, silver and lead are also mined. The value of gold mined in 1937 was \$143,000.

The territory is accessible from San Francisco, Seattle, and Vancouver by boat to Skagway, at the head of the Lynn Canal; thence by rail to White Horse; and thence down the Yukon to Dawson. Within the country the Yukon River and its tributaries form the principal transportation route. There are about 100 miles of railway running from Skagway to White Horse, and from Dawson to the Klondike region. There is a

movement on in British Columbia for the annexation of Yukon. The principal exports are gold and furs; chief imports, canned and woolen goods and mining machinery.

Yukon Gold Fields. Gold was found on the Yukon as early as 1862, and in paying quantities on Stewart River and at Forty-mile Creek in 1886. In 1896 an enormously rich strike was made on the Klondike River, and by 1898 between 30,000 and 40,000 people had rushed to this new field.

Of the important districts on the Yukon in Alaska, the most westerly is the Rampart region, just above the Tanana River; a hundred miles east on the Tanana is the Fairbanks district; Birch Creek is 140 miles above Rampart, on the Yukon, and Eagle and Fortymile as much farther up the river. The Inniko-Iditarod region is producing in increasing quantities. The Klondike is just across the international boundary in Canada.

Six-sevenths of the gold production is from placers in all this Alaskan region, and practically all from the Yukon is placer gold. As a rule, the richest deposits lie well toward bed rock in frozen gravels that have to be thawed out. These gravels are the courses of ancient streams, and the gold has been concentrated by them from the disintegrating quartz lodes existing in their vicinity. In the Klondike, recent streams have cut a second time into these old channels, and reconcentrated a part of the gold that occurred in them. This accounts for their extraordinary richness. The chief mining operations (85 per cent.) are carried on from June to September.

Yukon River, the largest river of the American continent that flows into the Pacific, is formed by the junction of the Lewes and Pelly Rivers near Fort Selkirk, Yukon Territory. The Lewes rises on the northern flank of the Coast Range in British Columbia, only 25 m. inland from Dyea, and flows through a series of lakes, among which is Lake Bennett. From Fort Selkirk the Yukon flows northwest to the Arctic Circle, then turns at almost a right angle, flowing southwest to the sea. The upper course is cut into a plateau region to a depth of 2,000 to 3,000 feet. Its lower course is less rugged; but it maintains a gradient of about one foot to the mile.

Yule, the old name for Christmas, still used provincially, as well as in Yule log, Yule cake, Yuletide. Among Scandinavians it was in olden times a season of rejoicing at the turn of the year. But the nature of the old

heathen festival and its observances have been overlaid or transformed by the Christian institution. See **CHRISTMAS**.

Yuma, Arizona (p. 9,145), on the Colorado River and the mouth of the Gila River, 180 m. s. of Phoenix, is a trading and shipping center. There are lead, copper and silver mines, dairy and truck farms.

Yuma Project, an undertaking authorized by the U. S. Government in 1904, to irrigate from the Colorado River 130,000 acres in California and Arizona. The chief features of the project are the diversion dam at Laguna, 40 feet high (completed in 1909); a concrete-lined siphon, 1,000 feet long and 14 feet in interior diameter, under the Colorado River at Yuma (completed in 1912); 402 miles of canals, and 338,080 feet of dikes. The plan includes the diversion of water from the Colorado at Laguna dam to feed two canal systems, one proceeding on the California side to Yuma, and there crossing the river by means of the tunnel to irrigate the Lower Colorado Valley; the other, on the Arizona side, serving the lands east of the Colorado and north of the Gila Rivers.

Yumas, an Indian tribe residing near the mouth of the Colorado River. The name is used by anthropologists to designate a linguistic family made up of the following tribes: Cocopas, Comeyas, Diegueños. Maricopas, Mohaves, Tontos, Seris, and Yumas. Their original territory included Lower California, the extreme southern part of California, and the part of Arizona east and south of the Colorado River. There are also a few scattered bands in Mexico. It is probable that the valley of the Colorado was their home for centuries preceding their discovery by Coronado in 1540. The Yumas, Maricopas, and Mohaves were agricultural, cultivating large fields of corn and beans, and irrigating their plantations by trenches. While during the past century they have lived in brush shelters and cave-like dwellings, there are reasons for believing that they formerly lived in villages of adobe houses, ruins of which are abundant in the valley of the Colorado.

Yung Wing (1828-1912), was born near Macao, China. A great lover of education, he persuaded the Chinese government (1871) to adopt a plan for educating Chinese youth in the United States. He was made chief commissioner of this plan, and was the means of

sending many Chinese to American colleges. He was an associate of the Chinese minister at Washington for a time, and in 1902 settled in Hartford, Conn.

Yunnan, province, China (Marco Polo's **CARAGAN**). North Yunnan consists of wind-swept downs, at an altitude of from 4,000 to 7,000 feet, between low ranges of mountains, and intersected by deep ravines, hiding rivers which not infrequently follow subterranean courses. Cart traffic exists, but roads are bad. In West Yunnan the country is more mountainous, and the rivers are deeper, rendering communication across them almost impossible. On the southwest and west the descent from the center of the province is easier. Large lakes are not infrequent.

Excellent crops are obtained of rice, corn, buckwheat, and other grains, but cotton has to be imported. Opium, largely cultivated and exported until the anti-opium edict of 1906, is being replaced by sericulture. The tin and copper mines are of well-tested repute. Coal and iron are common, and are easily obtained; galena, mercury, and gold are also found, and brine wells are worked. The entire transit trade through Tongking is between Yunnan and Hong Kong. The total imports in 1912 were valued at \$7,227,223, and the exports at \$9,304,071. Railroads are projected to connect Yunnan with Canton via Kwangsi, and Roehiu (the tin-mining center) with Meng-tsu on the French line from Tongking. A School of Agriculture and other schools of the Western type have been established. Area 146,680 sq. m.; p. about 12,000,000.

Yunnan, **Yunnan fu**, or **Kunming**, city of China, capital of the above province. The city is surrounded by walls, and is intersected by canals. Since the opening of the railway from Tongking, in 1910, and the opening of the port to foreign residence and trade, a fresh impetus has been given to commerce; p. 150,000.

Yurok, a name given to a few related tribes of North American Indians in California on the lower Klamath River. They constitute a distinct linguistic stock.

Yuryev, or **Yuriev**, formerly **Dorpat**, tn., Estonia. It has a university (founded by Gustavus Adolphus in 1632); remains of an old pagan citadel, afterward the episcopal palace; a ruined cathedral, a fine example of northern Gothic brickwork; p. 60,697.

Z

Z

Zambezi

Z represents voiced *s*. It has never been much used in English, except for foreign words; the sound *z* being generally represented by *s*. In 'azure' and other words *z* has the value *zh*. The obsolete letter *Z* is a form of *g*. In the Greek and Semitic alphabets *z* is the seventh letter. It was the last addition to the Latin alphabet, and so put at the end. It was borrowed by the Romans to represent Greek words, and was rarely used by them. In the Greek alphabet it is believed to have had a compound value, both *dz* and *zd*.

Zaandam, incorrectly **Saardam**, town, Netherlands, in the prov. of North Holland, 6 m. by rail n.w. of Amsterdam. It has oil mills, sawmills, and factories for paper, cement, and colors. Zaandam was formerly the chief Dutch port for Greenland whale fishery. Here Peter the Great of Russia (1697) studied shipbuilding; p. 31,624.

Zabern, or **Saverne**, town in Alsace, France, notable as the scene in 1913-14 of the so-called *Zabern Affair*, a conflict between the military garrison and the civilian population that provoked a crisis in the Reichstag. A young German lieutenant (Alsace was then under German rule), made himself obnoxious to the townsfolk by declaring to his command that he would willingly reward, out of his own pocket, any soldier who 'would run his bayonet through an Alsatian.' He created still further hostility by attacking a lame cobbler who had derided him, and frequent clashes between the soldiers and civilians ensued. The matter having come to the attention of the Reichstag a vote of censure was passed, but was disregarded by the Imperial Ministry, and though the garrison was transferred to another station and the officer was sentenced by court martial to a brief imprisonment, his promotion soon followed. The town has manufactures of agricultural instruments; p. 8,600.

Zacatecas, city, Mexico. Pottery is manufactured, but the city is chiefly important as a silver mining center. It was founded in 1546 and incorporated as a city in 1585; p. 15,468.

Zaccheus, a chief publican or tax collector, in Jericho, who climbed up into a sycamore tree in order that he might see Jesus over the heads of the crowd. Jesus called him down, lodged with him for the day, and so impressed him that he offered to bestow half of his great possessions on the poor and repay fourfold if he had 'wrongfully exacted ought of any man.' For his story see Luke xix, 1-10.

Zacharias, Pope (741-752), a Greek by birth, succeeded Gregory III.

Zaharoff, Sir Basil (1849-1936), European munitions executive. He was born Basileios Zacharias, the son of poor Greek parents who Russianized the name when they fled to Odessa from a Turkish massacre. As a munitions salesman, first for Vickers, Ltd., of England then for other firms he amassed a huge fortune. He owned the Casino at Monte Carlo, and was knighted by George v. of England.

Zagazig, or **Zakazik**, tn., Lower Egypt. It is the center of cotton and grain trade; p. 52,839.

Zagreb, Croatia. See **Agram**.

Zaimis, Alexandros (1855-1936), Greek statesman, was born in Athens, and was educated at Athens and at Berlin, Heidelberg, and Paris. He was elected a deputy in 1885, and was president of the chamber in 1895-7. He was minister of justice in 1890-2, and was premier from 1897 to 1899, and in 1901-2. He held for a time the high commissionership of Crete, was prime minister for brief periods in 1915, 1916, and 1917. Since 1929 he has been President of Greece.

Zaleucus, the earliest lawgiver of ancient Greece, belonged to the city of Locri Epizephyrii in Southern Italy. His legislation probably dates in the 7th century B.C.

Zambales, province, Philippines. Agriculture is the chief industry, and rice and wheat are the leading crops; p. 105,000.

Zambezi, a large river of South Central Africa, the fourth in size on the continent, with a course of over 1,600 m. and a drainage area estimated at over 600,000 sq. m. It rises in Lunda county on the borders of

Angola, probably in the marshy lake Dilolo. It is soon joined by two small branches and, further increased by the waters of the Uyen-go, forms what is known as the Upper Zambezi flowing in a south and easterly direction across Rhodesia to Victoria Falls, a mighty cataract nearly a m. wide and 400 ft. deep, whose gorge below is spanned by a railway bridge 650 ft. long and 420 ft. above the river level. The river then takes a northeasterly direction and enters Mozambique at Zumbo, where it is joined by the Aroangiva. Its course through Mozambique is mostly through broad, wooded valleys and rich fertile plains although it is so frequently interrupted by rapids as to be practically unnavigable. About 400 m. from the sea are the Keb-rabassa rapids, and from that point the river widens out, flowing placidly past Tete, its waters broken by many sandy islets but navigable to the Indian Ocean, which it enters by a seven-branched delta. Besides the Aroangiva, the chief tributary is the Shire, which drains Lake Nyasa, but there are many small streams joining the river throughout its course. Crocodiles are numerous in the stream, and the banks are inhabited by herons, egrets, ducks, geese, and plovers. Vegetation is luxuriant, particularly along the upper reaches, and there are native villages and missionary stations at various points. The upper part of the Zambezi was first explored by Livingstone in 1854.

Zamboanga, district, in the Philippine Islands, in the western part of Mindanao, with three peninsulas jutting out into the Celebes Sea. It has an area of 3,056 sq. m. Teak, juniper, and resinous and other valuable woods are abundant. Rice, hemp, coffee, tobacco, sugar cane, corn, and sweet potatoes are grown. Live-stock is raised. The district is noted for its salubrious climate. Zamboanga, the capital, is 561 m. s.e. of Manila; p. 147,000.

Zamora, city, Spain, capital of the province of Zamora, on the Douro River, here crossed by a fine bridge (14th century); 40 m. n. of Salamanca. It is an ancient walled city, with a twelfth century cathedral and a municipal building dating from 1622. Textiles, leather, and pottery are manufactured; p. 20,998.

Zanesville, city, Ohio, co. seat of Muskingum co., at the junction of the Muskingum and the Licking Rivers, and on the Baltimore and Ohio, the Pennsylvania, the Wheeling and Lake Erie, the Zanesville and Western, and the Zanesville Terminal Railroads; 54 m.

e. of Columbus and 77 m. w. of Wheeling, West Virginia, on the National Highway. Noteworthy institutions and buildings are the McIntire Public Library, with a collection of 30,000 volumes, High School, two hospitals, Soldiers' and Sailors' Memorial Hall, Government Building, County Court House, Masonic Temple, and Odd Fellows Hall. The city has six parks, covering an area of 80 acres.

Shops of the Baltimore and Ohio Railroad are located here, and there are manufactures of tiling, pottery, brick, boilers, engines, glass, iron pipes and tubing, castings, sheet steel, clothing, and gloves. The city serves as the banking and commercial center for a large agricultural area and has more than 100 manufacturing establishments. There are many active gas and oil wells in the vicinity, and considerable quantities of unmined coal; p. 40,517.

Zangwill, Israel (1864-1926), English writer, was born in London, of Hebrew parents. He became a teacher in Spitalfields, and subsequently a journalist. He published novels, essays, poems, and plays, and distinguished himself as a Zionist lecturer. Among his general works are: *The Premier and the Painter* (1888); *The Bachelors' Club* (1891); *The Big Bow Mystery* (1892); *The Old Maids' Club* (1892); *Children of the Ghetto* (1892); *Ghetto Tragedies* (1893); *The King of Schnorrers* (1894); *The Master* (1895); *Dreamers of the Ghetto* (1898); *The Mantle of Elijah* (1900); *The Grey Wig* (1903); *Blind Children* (verse, 1903); *Ghetto Comedies* (1907); *Italian Fantasies* (1910). Among his plays are: *Six Persons* (1892); *Children of the Ghetto* (1899); *The Moment of Death* (1900); *The Revolted Daughter* (1901); *Merely Mary Ann* (1904); *The Serio-Comic Governess* (1904); *Jinny the Carrier* (1905); *Nurse Marjorie* (1906); *The Melting Pot* (1908); *The War God* (1911); *The Next Religion* (1912); *Plaster Saints* (1914); (the last four also in book form); *The War for the World* (1916).

Zante (ancient *Zacynthus*), capital of the island of same name, the southernmost of the Ionian Isles of Greece. The town is situated on the eastern coast. It has manufactures of carpets, and of gold and silver articles. The island, known as the 'Golden Island,' forms a nomarchy or department of Greece. Exports include currants, soap, and pyrene and olive oils. It is subject to earthquakes. Area, 277 sq. m.; p. 40,000.

Zanzibar, sultanate under British protection, consisting of a strip of the coast of

British East Africa, 10 m. deep, from the mouth of the Umbu to Kipini on the Ozi, together with the islands of Zanzibar, Pemba, and others, and the mainland town of Kismayu. The chief ports are Zanzibar, Mombasa, and Kismayu. Area (exclusive of coast territory), 1,020 sq. m.; p. 200,000. The Island of Zanzibar is separated from German East Africa by a channel 20 m. wide, and has an area of 640 sq. m. It is traversed from n. to s. by undulating hills, rising to nearly 900 ft. in the n., and is exposed to the full influence of the Indian Ocean. The mean yearly temperature is about 80° F., and the mean annual rainfall 61 inches. The heat is oppressive only in December and January. The chief crops are sorghum, rice, cloves, chillies, and coconuts. There is also a promising cultivation of tea, coffee, and vanilla. In 1914 the imports were valued at \$3,817,000, and the exports (chiefly cloves, copra, ivory, piece goods, and grain) at \$4,075,000; p. of island, 115,000.

The Imams of Muscat made themselves masters of Zanzibar between 1698 and 1807. Bargash, sultan of Zanzibar in 1870-88, saw the partition of his dominions by Great Britain, Germany, and Italy. In 1890 the sultanate of Zanzibar was proclaimed a British protectorate, and for the recognition of these rights Great Britain ceded Heligoland to Germany, and renounced to France her claims to Madagascar. The sultan, with a civil grant of 120,000 rupees, was made virtually a crown pensioner. In 1897 the legal status of slavery was abolished. The British Government is represented by a resident and a high commissioner. Consult R. N. Lyne's *Zanzibar in Contemporary Times*; Ethel Younghusband's *Glimpses of East Africa and Zanzibar*.

Zaparos, a tribe of South American Indians, formerly powerful in Ecuador. Although described as friendly to Europeans, the Zaparos are in a state of continual feud among themselves. Physically they are of somewhat Mongolic aspect with round, flat features, small, oblique-set eyes, small, thick nose and lips, beardless chin, and of a light coppery color. They now number about 20,000.

Zápolya, or **Zapoly**, an Hungarian royal family.—Stephen (d. 1499) distinguished himself under Matthias Corvinus; succeeded in expelling the son of Casimir IV., king of Poland, who endeavored to secure the throne of Hungary; defeated the Turks and the imperialists; and became governor of Austria (1483).—His son John (1487-1540), voivode of Transylvania (1510), quelled the revolt

under Dosza (1514), and was proclaimed king of Hungary (1526). Defeated by Ferdinand of Austria (1528), he fled to Poland, but made peace (1538).—His son John Sigismund (d. 1571), who succeeded in 1540, was forced in 1551 by Sultan Solymán to change his title of king for that of voivode of Transylvania, and abdicated in 1570.

Zapotecs, one of the chief civilized nations of Mexico, who in pre-Columbian times were a powerful kingdom in the present state of Oaxaca, which, however, was overthrown by the Aztecs toward the close of the fifth century. Their general culture is attested by the ruins of their palace at Mitla, one of the finest monuments in the New World. They are still numerous in Eastern Oaxaca, where they speak a cultivated and highly polysynthetic stock language.

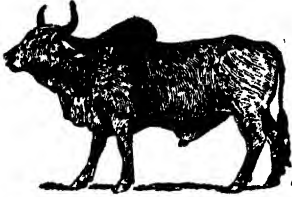
Zealand, Dutch island. See **Zeeland**.

Zealots, a Jewish party which originated in the reign of Herod the Great. Josephus (*Ant.* xviii. 1, 6) calls them the fourth party (besides the Pharisees, Sadducees, and Essenes), that of the nationalists, who revived the Maccabean movement. Their headquarters were the Galilean highlands. A strong party in the Sanhedrin was in sympathy with their aspirations. The lawlessness of the Zealots was one of the causes of the war with Rome (A.D. 66-70).

Zebra, the type of a group of striped, horselike animals, peculiar to the African continent. In having callosities on the fore limbs only, in the characters of the tail, ears, and hoofs, the zebras approach the asses more nearly than the true horses; but they differ from the asses in the extensive striping of the head and body. The True or Mountain Zebra (*Equus zebra*) was formerly common in the mountain regions of Cape Colony, but is now confined to certain protected districts in the e. It stands a little over four ft. at the shoulder, and is striped over head, legs, tail, and body, with the exception of the under surface and the inner side of the thighs. The stripes are broad, and are black on a white ground.

Zebu (*Bos indicus*), the domesticated ox of India, which differs from the European ox in the presence of a large hump on the withers, the large drooping ears, the enormous dewlap, as well as in coloration and habits. It is usually ashy gray, but cream, white, and even black varieties occur. The disposition is gentle, and in India the animals are used for draught purposes. The sacred bulls of India, known as Brahman oxen, which are allowed

to wander freely about the bazaars, belong to this species. Humped cattle, which are at least closely related to the zebu, occur in Africa, Madagascar, and China. The voice in all varieties is a grunt; there is great variation in size.



Zebu.

Zechariah, 'the son of Berechiah,' was born in Babylonia during the captivity, and accompanied the first band of exiles on their return to Judæa under Zerubbabel and Joshua. Nothing further is known of him except that in the second and fourth years of Darius Hystaspis (520-518 B.C.), he stirred up the zeal of the Jews to complete the Temple. Of the book that bears his name (eleventh in order among the twelve minor prophets) only the first eight chapters are attributable to him. They consist of three parts. The first is a brief exhortation to repentance; the second is made up of eight visions relating to the rebuilding of the Temple, the scattering of Israel's enemies, the future glory of Jerusalem, the priestly dignity of Joshua, and the advent of the Messiah, the removal of all wickedness, and the execution of judgments on Babylonia; the third contains a hopeful treatment as to the permanence of fast days, and gives a bright picture of the Messianic future.

The remaining six chapters are now regarded by many leading scholars as being anonymous. They fall into two sections now attributed to two distinct authors. The first consists of chapters ix.-xi., to which it has been usual, since Ewald, to add xiii. 7-9. Chapter xii. 1-xiii. 6; xiv., used to be assigned to the last days of the Judean kingdom, but this section is now generally considered to be post-exilic. As regards all six chapters, though assigning them to two separate authors, Wellhausen argues for a very late date—as late indeed as that of Antiochus Epiphanes—on such grounds as the type of eschatology employed (which was that introduced by Ezekiel), the importance assigned to the Temple service, the absence of an actual Davidic king, the allusions to the 'race of Ashdod'

(comp. Neh. xiii. 23, 24), to Greece, and to idolatry (of which there was a revival late in the Macedonian period). The presence of phrases suggestive of the older prophecy, and the allusions to Ephraim, Assyria, and the like he explains by the desire of the author 'to give his oracles an archaic garb,' thus inverting the theory of Kuenen, Driver, and others that the oracles are really old, but with later elements superadded.

Zedekiah, the last king of Judah (597-586 B.C.), was the son of Josiah. A vassal of Nebuchadnezzar, he coquetted with Egypt, and so brought about the ruin of Jerusalem and his kingdom. Two false prophets likewise bore the ill-fated name—the opponent of Micaiah under Ahab, and a co-exile of Jeconiah, denounced by Jeremiah.

Zeebrugge ('Bruges on the Sea'), a seaport of Belgium, in West Flanders, the port of the city of Bruges. Zeebrugge is 8 m. n. of Bruges by rail, and 6 m. by way of the Canal Maritime, a modern waterway 230 ft. wide, accommodating seagoing vessels having a draft of twenty-five ft. The harbor has been greatly improved in recent years at a total cost exceeding \$8,000,000, and is protected on the n.w. by a massive concrete mole over a mile in length. Previous to World War I Zeebrugge had shared in the reviving prosperity of Bruges. Its industries included market gardens, potteries, and lace works. After its occupation by the Germans it was converted by them into an important seaplane and submarine station, and was bombarded a number of times by the Allies.

Zeeland, province Netherlands, adjacent to the North Sea, consists of a group of islands at the mouths of the Maas (Meuse), Waal, and Scheldt. These islands, lying for the most part below sea level, are protected by dikes and embankments. Over 220,000 acres have been won back from the sea. The soil is very fertile. Fishing is carried on. Capital, Middleburg. Area, 689 sq. m.; p. 247,970.

Zeeman Effect. In 1896 the Dutch physicist Zeeman discovered that the two yellow lines into which the light of a Bunsen flame colored by sodium is resolved by the spectroscope became broader when the flame was placed between the poles of a powerful electro-magnet. This phenomenon has received the name of the Zeeman effect.

Zeitun, or **Zeitoun**, town, Turkey. Inhabited by Armenian Christians, it has been the scene of frequent massacres by the Turks, and was practically wiped out during the World War.

Zemstvo, district and provincial assemblies in Russia, whose influence have had a powerful effect on Russian history, were founded in 1864 by Alexander II. District zemstvos were indirectly elected, and were made up of nobles and peasants in about equal numbers, together with a few merchants. They met for about fifteen days once a year. Provincial zemstvos were composed of members of the upper classes, elected by the district zemstvos in a province or government. Nominally representative and independent, the zemstvos were under state control, and the provincial governor had a veto on all resolutions of both bodies. They inaugurated improvements in agriculture, helped to build schools and hospitals, and worked for the amelioration of social evils.

Zenana, in India the portion of the native house reserved for the women, thus corresponding to the Moslem harem.

Zend Avesta, the sacred books of the Parsees. Mingled with treatises on astronomy, medicine, botany, agriculture, and philosophy, these books contain prayers, moral precepts, and rules of conduct. The original work is supposed to have been destroyed, either during the invasion of Persia by Alexander the Great, or immediately after the conquest of the country by the Arabs. The books have since been recollated and revised.

Zenger (John) Peter (c. 1680-1746), American publisher, was born in Germany, and came to New York about 1700. After serving an apprenticeship in the printing trade he began (1733) the publication of the *New York Weekly Journal*. In 1734, because of his virulent criticisms of the government, he was arrested and imprisoned, and at his trial the authorities used every means to secure his conviction. The jury found him 'not guilty,' and the verdict created much enthusiasm, being regarded as a triumphant vindication of the liberty of the press.

Zenith, the point of the celestial sphere vertically above the spectator. Zenith distance, which is complementary to altitude, is the angular space between the zenith and a celestial object. Sir George Airy invented a reflex zenith tube, chiefly for observing the Greenwich zenith star, Draconis, in which the image was viewed by reflection from a surface of mercury.

Zenjan, or **Zinjan**, tn., Iran, capital of Khamseh prov.; 175 m. n.w. of Teheran, and on the road to Tabriz. It has an important bazaar. It was formerly a stronghold of Babism; p. 25,000.

Zeno, ancient Greek philosopher of the Eleatic School, born about 490 B.C., was a native of Elea (Velia) in Southern Italy, and a pupil of Parmenides. At the age of forty he went to Athens, and is said to have taught Pericles and Callias. None of his philosophical writings remain. Aristotle calls him the father of dialectic or logic. He made use of famous paradoxes, such as that of Achilles and the tortoise, to prove that motion is an illusion of the senses.

Zeno (c. 360-270 B.C.), founder of the Stoic philosophy, was a native of Citium in Cyprus. He is said to have taken up his residence in Athens; opened a school in the colonnade, which was adorned by the paintings of Polygnotus—the *Stoa Poikile*—whence his disciples were called *Stoics* (see STOICISM). He was a friend of Antigonus Gonatas, king of Macedonia. None of his works are extant. His threefold division of philosophy into ethics, physics, and logic, and still more the practical application of philosophy to conduct, were the novelties of the Stoic teaching. It is difficult to distinguish the precepts of Zeno himself from the additions of his successors Cleanthes and Chrysippus; but he seems to have laid down the main principles of Stoicism.

Zenobia, wife of Odenathus, prince—afterward called king—of Palmyra (Tadmor in Syria); her native name was Bat Zabbai. Odenathus fought against the Persians on behalf of the Emperor Gallienus. After his death, in 266 or 267, Zenobia ruled, and conquered Egypt. Then, aiming at complete independence of the Roman empire, she was defeated by Aurelian at Hemesa (272) and herself captured. Shortly afterward Aurelian destroyed Palmyra, razing its walls. Zenobia was taken to Rome, but was allowed to live near Tivoli.

Zenos, Andrew Constantine (1855-1942), U. S. educator, was born in Constantinople, and was graduated from Robert College (1872) and Princeton Theological Seminary (1880). From 1883 to 1891 he held successive professorships at Lake Forest University and at Hartford Theological Seminary; became professor of church history at McCormick Theological Seminary in 1891; and since 1894 has been professor of Biblical theology in that institution. He edited various Greek texts, and wrote: *Elements of Higher Criticism* (1895); *Compendium of Church History* (1896); *The Son of Man* (1914); *The Plastic Age of the Gospel* (1927).

Zeolites, a group of minerals, which con-

sist chiefly of hydrous silicates of aluminum, sodium, and calcium. They lose their combined water readily, some of them in dry air at ordinary temperatures (laumontite), others when warmed, and all give off water freely, and seem to boil when heated before the blowpipe. They mostly occur well crystallized, and are secondary products of the decomposition of the feldspars and feldspathoids of igneous rocks. Very fine specimens are obtained from veins and cavities in the basalts and similar rocks of Iceland, Scotland, Bohemia, India, and South Africa. Among the best known are *analcite*, *laumontite*, *natrolite*, *stilbite* and *chabazite*.

Zephariah, a Hebrew prophet, possibly the great-great-grandson of King Hezekiah, who lived and prophesied in Jerusalem in the reign of Josiah. His prophecies are contained in the ninth book of the Minor Prophets.

Zephyrus, in Greek mythology, the west wind, personified as a son of Astræus and Eos, and brother of Boreas, the north wind.

Zeppelin, Ferdinand, Count von (1838-1917), celebrated German aeronaut and inventor, was born at Constance, Baden. He was educated at the University of Tübingen, and entering the army in 1858, was made lieutenant at the age of twenty-three. He was on special duty as Prussian military *attaché* during the American Civil War, and narrowly escaped capture by the Confederates at Fredericksburg. On his return to Germany he took part in the Austro-Prussian War of 1866 and the Franco-Prussian War of 1870. He was later promoted major-general; became a member of the Federal Council of the German Empire; and in 1891 retired from active service with the rank of general of cavalry.

While in the army Count Zeppelin became an enthusiastic student of aeronautics, and after his retirement devoted himself wholly to that science. The first Zeppelin airship was completed in 1900, and while the first trial trip was satisfactory, succeeding trips were comparative failures. Several wealthy men of Germany came to the financial aid of the inventor, and after many costly experiments an airship was completed in 1906 that carried twelve passengers, and remained in the air for two hours, under complete control. Then followed more trials and triumphs until the Zeppelin of the present day was perfected. In 1909 a factory was opened at Friedrichshafen.

Zerbst, town, Germany. The ducal castle and church of St. Nicholas (eleventh cen-

tury) are noteworthy. It has manufactures of gold and silver articles, chemicals, beer, machinery, and starch; p. 19,471.

Zero, the number 0, and the point from which the reckoning begins on scales such as those of the barometer, etc. Zero represents the entire absence of the particular quantity that is in consideration, and is thus used incorrectly in the case of the temperatures 0° C. and 0° F.; but a body at a point approximately represented by -273° C. or -459.4° F. is really at the zero of temperature.

Zerubbabel, or **Zerubabel**, governor of Jerusalem at the time when the Second Temple was constructed (520-516 B.C.).

Zeuglodonts, an extinct fossil whale which attained a length of fifty to seventy ft., and is found in Eocene beds in North America, Europe, and Egypt. It had a long narrow skull, with powerful jaws, which were provided with teeth, conical in front, but sharp-edged and adapted for cutting behind.

Zeus. See **Jupiter**.

Zeuss, Johann Kaspar (1806-56), founder of Celtic philology, born at Vogtendorf in Bavaria. He was appointed professor of philology at Bamberg (1847). His principal writings were *Die Deutschen und die Nachbarstämme* (1837), *Die Herkunft der Bayern von den Markomannen* (1839), and a work which secured for him world-wide reputation for scholarship—*Grammatica Celtica* (1853).

Zeuxis (fl. 425-400 B.C.), Greek painter, was a native of Heraclea, on the Euxine. None of his works survive, but many stories testify to his marvellous power. Aristotle criticised his pictures as wanting in character—that is, in the expression of moral sentiments. His most famous pictures were *Aphrodite*, *Infant Hercules Strangling the Serpents*, and *Zeus Enthroned*.

Zilleh, or **Zileh**, town, Sivas vilayet. It is on the site of the ancient *Zela*, on the acropolis of which was built a castle, the ruins of which still overlook the modern town; p. 20,000.

Zimbabwe, or **Great Zimbabwe**, a collection of ruins in South Africa, 17 m. S. of Victoria, Mashonaland. Some of the walls are 35 ft. high, and in some places 16 ft. thick. According to one theory the buildings were erected by some Semitic race—possibly the Sabæans from Southern Arabia—as a stronghold and as a place for smelting and purifying ores. According to another theory, they are contemporary with medieval Europe, and are of African Negro origin. They were

rediscovered by Adam Renders in 1868. There are three distinct groups of ruins, the 'Elliptical Temple,' the 'Acropolis,' and the 'Valley Ruins.' Consult Bent's *Ruined Cities of Mashonaland*; Hall and Neal's *Great Zimbabwe*; R. N. Hall's *Prehistoric Rhodesia* (1910).

Zimbalist, Efrem (1889), Russian violinist, was born in Rostov-on-Don, and studied under Leopold Auer at Petrograd. Since 1907 he has toured in Europe and the United States, and has received high commendation for his brilliant technique. He was director of Curtis Institute of Music (1941-).

Zinc (Zn, 65.4), a metallic element occurring in nature only in combination with other elements. It is a bluish-white, crystalline metal that is brittle at ordinary temperatures, but becomes malleable between 100° and 150° C. Its specific gravity is 7.1; it melts at 419° C., boils at 925° C., and is a fair conductor of electricity. It burns in the air at a high red heat with a bright, greenish white flame, emitting dense white fumes. Commercial zinc is usually rolled into sheets, and is commonly known as *Spelter*. Pure zinc is only very slowly attacked by mineral acids, but all commercial kinds dissolve in them very readily with evolution of hydrogen.

The principal zinc ores are the *sulphide*, *sphalerite*, or *blende*, ZnS; the *carbonate* or *smithsonite*, ZnCO₃; the *oxide* or *zincite*, ZnO; and the silicates (anhydrous) *willemitite*, Zn₂SiO₄, and (hydrous) *calamine*, Zn₂SiO₄·H₂O. Other ores are the franklinite aluminate, arsenate, phosphate, and sulphate. The sulphide contains, when pure, 67 per cent. of zinc and 33 of sulphur; the pure carbonate contains 52 per cent. of zinc.

Zinc, when rolled into sheets, is used for roofing, as it is but slowly affected by the weather, while it is also largely employed to alloy with other metals—with copper it forms brass. It is also valuable for coating or 'galvanizing' iron to keep it from rusting, the iron being very thoroughly cleaned and immersed in a bath of molten zinc. Zinc is used largely for the negative poles of primary batteries, both wet and dry, being the most electro-negative of the common metals; and is employed as a chemical reagent, and as a reducing agent in the manufacture of dye-stuffs.

Zinc oxide is of basic character, and from it, as from the metal itself, the salts of zinc can be obtained by solution in acids. Thus *zinc sulphate*, or *white vitriol*, is obtained when the oxide or metal is dissolved in dilute

sulphuric acid. The process is commonly employed in the latter case to prepare hydrogen. Zinc sulphate is prepared also by roasting sulphide ores, and crystallizes from water in colorless rhombic prisms of the formula ZnSO₄·7H₂O. It has a metallic taste, and acts as an astringent, being used on this account in the treatment of sores and ulcers. Internally it acts as a rapid emetic, and is thus employed in cases of poisoning.

Zinc chloride is obtained by dissolving the oxide, metal, or carbonate in hydrochloric acid, the solution on evaporation yielding a white soft deliquescent mass, with caustic properties, and acting as an irritant poison. It is employed in the solid form as a caustic, and in solution as an antiseptic; it is also used as a flux in soldering, and for weighting cotton goods.

The world production of zinc in 1937 amounted to 1,660,500 metric tons, divided among various producing countries as follows: Australia, 70,900; Belgium, 225,600; Canada, 143,900; France, 60,400; Germany, 163,200; Norway, 41,300; Poland, 107,200; U. S. S. R., 65,000; United States, 540,100; United Kingdom, 63,100. The United States is practically self-contained in the zinc industry. Almost none is imported and there is rarely an exportable surplus. Oklahoma, Illinois, and Kansas are the leading States in the production of zinc.

Zingiberaceae, a family of perennial tropical herbs, of which *Zingiber* (see GINGER), *Maranta* (see ARROWROOT), and *Canna* are typical species.

Zinnia, a genus of half-hardy plants of Mexico and the Southwestern United States, belonging to the Compositae family. They bear heterogamous, radiate flower heads, often brilliantly colored. The annual species are much grown in gardens, and are chiefly varieties of *Z. elegans*.

Zinzendorf und Pottendorf, Nicolaus Ludwig, Count von (1700-60), restorer of the church of the Moravian Brethren, was born at Dresden. In 1722 he founded the Moravian colony of Herrnhut in Saxony. Exiled by the government of Saxony (1736), he traveled in Europe and America on behalf of his church, making many converts, until Frederick II. gave the Moravians religious liberty (1742). He established the Moravian colony at Bethlehem, Pa. Frederick II. granted the Moravians full religious liberty. See MORAVIANS. Consult *Lives* by Varnhagen von Ense and Spargenberg.

Zion. See Jerusalem; Jews.

Zionism, or the **Zionist Movement**, a modern movement having as its object the creation of a publicly recognized, legally secured home for the Jewish people in Palestine. The hope of restoration and of a renewed national existence has been cherished as an ideal by orthodox Jews since the destruction of the Temple (70 A.D.), and in the nineteenth century the growing spirit of nationality in world politics and the increasing menace of anti-Semitism combined to create a practical movement for its realization. An international society known as Lovers of Zion was founded in 1882, and a number of Jewish settlements were established mainly by philanthropic enterprises in Palestine.

The real founder of modern political Zionism, however, was Dr. Theodor Herzl, an Austrian journalist whose book, *Der Judenstaat* ('The Jewish State'), published in 1896, outlined a plan involving the organization of a society of Jews to undertake the necessary scientific and political work, and of a Jewish Company, similar to the great British trading companies, to establish the new community in Palestine or elsewhere. The plan was endorsed by the Zion Society of Vienna, and a call was issued for the first Zionist Congress, which assembled at Basel in August, 1897, and adopted as its program the creation for the Jews of a 'home in Palestine guaranteed by public law.' Since that time Zionist congresses have been held regularly, chiefly at Basel; a large number of Zionist societies have been organized; and national federations have been formed in many countries.

Before World War I the Zionist movement had made comparatively little progress along political lines. Negotiations with the Turks in regard to Palestine had been brought to naught by the Turkish revolution, and Great Britain's offer of a tract of land in East Africa had been rejected by a majority as out of harmony with the spirit of the movement. In 1917 the movement received a great impetus with the British capture of Jerusalem, and the declaration by the British Government that it would make every endeavor to establish in Palestine a national home for the Jewish people. Subsequently, the American Zionists met in conference at Baltimore, and inaugurated a campaign for large funds to be devoted to preliminary work.

Leadership of the Zion organization is vested in an Actions Committee composed of delegates from the various territorial units,

and a smaller Actions Committee of five members chosen at the biennial congress. The practical instrument of the movement is the Jewish Colonial Trust, with headquarters in London. In 1939 the British government issued a white paper limiting 'for all time' the number of Jews permitted to immigrate into Palestine. Zionism has striven to nullify that policy and to bring about establishment of a Jewish national state in Palestine after World War II. (See PALESTINE.)

Zircon, ZrSiO_4 , a mineral consisting of silicate of zirconium. It is found in Ceylon, the Urals, Norway and elsewhere in Europe, North Carolina, Colorado, California and other States. The colorless or finely colored crystals are used as gems, and opaque varieties form the source of zirconium.

Zirconium (Zr, 90.6), a rare element, occurring as a silicate, ZrSiO_4 , in *zircon* or *hyacinth*. It is prepared by displacement by aluminum or sodium from its fluorine-potassium compound, and forms silvery gray scales or a black amorphous powder. The zirconium salts are derived from the feebly basic zirconium hydroxide, Zr(OH)_4 . Zirconium oxide has been used as a component of incandescent gas mantles, as an insulator, in the making of paints and lacquers, and in one form as an abrasive; while the colored varieties of the naturally occurring silicate are used as gems.

Zither, a stringed instrument, thought to be of ancient Asiatic or Greek origin, which consists of a flat, shallow, oblong, wooden box, over the sounding-board of which the strings, resting on a bridge, are stretched. Concert instruments contain a fretted finger board, and the melody strings over this are sounded by means of a metal plectrum on the right thumb, the accompaniment strings being plucked by the fingers.

Zittau, town, Saxony; has manufactures of damask and woolen goods; p. 40,000.

Znaim, town, Czechoslovakia. Pottery is the chief manufacture. Here was concluded the armistice of 1809 between Austria and France, which led a few days later to the peace of Vienna; p. 21,197.

Zoar, village, Ohio. Until 1898 it was the seat of a German communistic society whose members were known as Separatists.

Zodiac, a belt of the sky extending 8° on each side of the ecliptic, and comprising the apparent paths of the sun, moon, and principal planets. It is divided into twelve signs of 30° each. The series begins with the vernal equinox, and shifts through precession. The

zodiac is of immemorial antiquity. It was invented in Babylonia.

Zodiacal Light, so called from its situation in the zodiac. It is a cone of faint luminosity, visible after sunset near the vernal equinox, and before sunrise, six months later, extending from the place of the sun over an arc of about 80°.

Zoe (c. 978-1050), Byzantine empress, was the daughter of Constantine VIII. She was accessory to the murder of her first husband, the Emperor Romanus (1034), after which she married and raised to the throne Michael IV. After his death (1041) she married (1042) Constantine IX.

Zola, Emile Edouard Charles Antoine (1840-1902), French novelist, born in Paris. He began early to write, his first book being *Contes à Ninon* (1864), which had some measure of success. The powerful but repulsive novel, *Thérèse Raquin*, which appeared in 1867, strengthened his reputation, as did the *Chronicles of the Rougon-Macquart Family*—the first series commencing with *La Fortune des Rougon* (1871), and concluding with *Son Excellence Eugène Rougon* (1875), the intermediate works of the series being *La Curée* (1872), *Le Ventre de Paris* (1872), *La Conquête de Plassans* (1873), and *La Faute de l'Abbé Mouret* (1874). This first series was eclipsed by the enormous popularity which attended his next novels. In 1877 *L'Assommoir* appeared—a novel depicting the awful consequences of the craving for drink. Then came *Nana* (1880), and then a second Rougon-Macquart series up to *Le Docteur Pascal* (1893). Zola also attacked the problem of miracle-working in *Lourdes*, of the Roman Catholic church as a means of popular reformation in *Rome*, of the inner life of the masses in *Paris*, of population in *Fécondité*, of labor and its agencies in *Travail*. He was the author of several plays and of numerous volumes of essays. He took a very prominent part in the rehabilitation of Captain Dreyfus. Having convinced himself that the captain was innocent, he attacked the army and all those opposed to Dreyfus in a denunciatory letter in the *Aurore* (1898), in which he openly challenged legal consequences. Other works are *La terre*, *La bête humaine*, *La débâcle*.

Zollverein, a German word meaning customs union. It first came into use as the name for the commercial arrangements set up (1833) between Prussia, Hesse-Kassel, Hesse-Darmstadt, Bavaria, and Württemberg, in virtue of which these states adopted a com-

mon tariff, and abandoned all duties which had hitherto been levied on goods imported from the other contracting states. A modern instance of customs union is the Imperial Preference which rebates duties between the several members of the British Empire.

Zone. A term widely used to indicate a certain strip or belt of any extensive medium or substance that is found capable of delimitation by some specific character. Thus in geography certain belts with distinct boundaries of latitude, or altitude, or temperature, or depth, or moisture, or vegetation, are known as zones. In dynamic geology there are shear zones, fault zones, zone of fracture, zone of flowage, zone of weathering, etc., each one a very definite unit with respect to some particular character or process. In geology the physical characters of rocks make it possible to divide strata into beds; on the other hand, life forms or fossils are used to establish zones or horizons characterized by particular species which do not appear lower or higher in vertical range. In accord with the evolution idea of life development, the identification of a particular zone in different areas is taken to indicate more or less perfect contemporaneity, subject only to such modification as may be attributed to local physiographic and climatic differences. The term is applied also to the practice in many municipalities of so regulating height, bulk and use of buildings as to segregate structures of certain types and for certain uses in districts or zones.

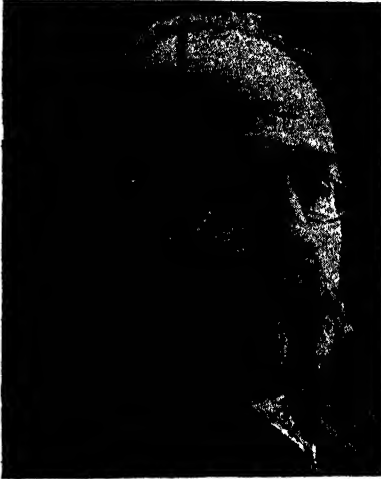
Zoology is the scientific study of animal life as distinguished from biology, which covers the study of plant life as well. See BIOLOGY, and the articles on the several species of animals.

Zoophyte, a name sometimes given to certain of the Coelenterata, notably to the sea-firs and their allies, from the apparent resemblance to a plant.

Zorn, Anders (1860-1920), Swedish painter and etcher, was born in Mora, Sweden. He early exhibited water colors at the Royal Academy. His portraits in oils included those of many wealthy Americans, made on visits to this country. These showed unusual attention to light and half-tones. He belonged to the impressionistic group of artists. Among his best works are the water-colors *Algiers Harbor* and *The Fish Market at St. Ives*; the portraits of Cleveland, Taft, and Roosevelt; *Coquelin Cadet*; the compositions *Night Effect*, *Summer in Sweden*, *Dagmar*, *Startled*;

and the etched portraits of Renan, Anatole France, Grover Cleveland, and Senator Mason.

Zorndorf, village, Prussia, was the scene of the defeat of the Russians by Frederick the Great on Aug. 25, 1758.



Emile Zola.

Zoroaster, or **Zarathushtra**, founder of the religion of the Parsees and of ancient Persia, was of princely descent, but little that is authentic is known of his life. He is supposed to have begun his ministry at the age of thirty, and to have been murdered, in his 75th year, at Bactria. See further under **ZOROASTRIANISM**.

Zoroastrianism, the religion of the ancient Persians, preached by Zoroaster, the date of the establishment of which is still uncertain, with a tendency to settle on the seventh to the six century B.C. It was a protest against polytheism, idolatry, and the licentiousness of the age. Its monotheism is thus expressed: 'There is only one God, and no other is to be compared to Him'; a Creator without form, invisible, mighty, just, merciful, and worthy of adoration. The teaching of the creed is conveyed in the simple declaration, 'Perform good actions, and refrain from evil ones.' Zoroaster recognized, as all revivalists have done, the existence of two powerful agencies—the creative and the destructive, the good and the evil; the soul in conflict with the body, the spirit warring against the flesh. Fire and light were taken to represent the beneficent agent, and darkness the evil. The founder made no attempt,

however, to reconcile man's liberty with God's providence, man's suffering with God's rectitude; but declared that everything was for the best for every individual. The Bible of the faith is *Zend-Avesta*; but a more modern and more popular code of morals is contained in the *Revelations of Arda Viraf*.

Zouaves, originally Kabyle soldiers of the French army, recruited (1830) in Algeria at the time of the taking of Algiers. After 1840 the Zouaves were entirely Frenchmen, who wore a semi-Moorish uniform. The Kabyles fought in the Franco-German War of 1870 as Turcos. Various military organizations in the U. S. have been uniformed as Zouaves, and several such commands participated in the Civil War. Among these Ellsworth's and Hawkins's Zouaves were particularly well known.

Zrinyi, Niklas, Count von (1508-66), Hungarian general, who distinguished himself in the wars with the Turks. He ably defended Croatia, of which he was ban (governor) from 1542, and his exploits have been made the subject of drama. In 1566, with 3,000 troops, he held the town of Sziget against Sülyman the Magnificent, who besieged it with more than 50,000 men, and fell fighting to the last.

Zuccaro, Federigo (1543-1609), Italian painter, was born in Tuscany; was assistant of his brother Taddeo (1529-66), who was engaged at the Vatican. Then he was employed in decorative painting at Florence and Venice, and was called to Rome in 1566 to complete Taddeo's work in the Vatican. On account of a quarrel he fled to France, and in 1574 he went to England. There he painted a number of portraits, including Queen Elizabeth's and Leicester's. After a visit to Spain, he founded at Rome the Academy of St. Luke.

Zug, Swiss canton, the smallest in area, (92 sq. m.), and the smallest but one in population, mainly German-speaking and Roman Catholics. It became a canton in 1352; p. 34.406.

Zuider Zee ('Southern Sea'), a gulf of the Netherlands, separated from the North Sea by a chain of islands, is 85 m. from n. to s., and 45 m. in greatest breadth, and covers an area of 2,027 sq. m. It is very shallow, the average depth being from 10 ft. to 19 ft.; but the action of the wind makes it necessary to protect the shores, particularly in the s., by dikes. Formerly a lake (Flevo), surrounded by fens and marshes, the Zuider Zee acquired its present dimensions through

inundations in the 12th to the 15th century. Reclamatory schemes have been discussed by the government.

Zukertort, Johann Hermann (1842-88), Polish chess master, a pupil of Anderssen, whom in 1871 he defeated. He beat Blackburne (1881), Rosenthal (1880), and Steinitz in 1883. Steinitz defeated him, however, in the U. S., in 1885.

Zukor, Adolph (1873-), motion picture producer, was born in Hungary. He came to the U. S. in 1888. He in 1912 founded the Famous Players Film Co.; and became president of the Paramount Publix Corp.

Zuloaga, Ignacio (1870-1945), Spanish painter and draughtsman. His work is mostly concerned with the Spanish scene. His paintings have been on exhibition at Brussels, Rome, New York and other world centers. Zuloaga has retained a sobriety of tone and simple harmony of color in his paintings. His best known works are *La Victime de la Fete*, *Le Nain Gregorio*, and *Les Sorciers*.

Zululand, a territory in Natal, British S. Africa, separated from it by the Tugela R., after being administered as a protectorate (along with Amatongaland) from 1887, was in December, 1897, incorporated with Natal. Including Amatongaland and the Ingwavuma district, it covers an area of 10,461 sq. m., and has a population (1900) of 185,000, the white population numbering about 1,300. St. Lucia Lagoon and Bay give it communication with the sea. Its coast lands are unhealthy, but the interior affords some of the finest pasture land in S. Africa; p. 250,000.

Zulus, or **Ama-Zulus**, a Bantu people of S.E. Africa, whose original domain lay between the Tugela R. and Lake St. Lucia, but early in the 19th century was extended by conquest over Natal, the late Boer states, Southern Rhodesia, and Gazaland, and at some points even beyond the Zambezi to Nyasaland and Lake Tanganyika. With the kindred Ama-Xosas, commonly called Kaffirs, they form the Zulu-Kaffir division of the southern Bantu family. Zulus, Xosas, Galekas, Gaikas, Tembos, and all the other Kaffirs, are essentially one people, with common physical and mental characters, speech, religion, usages, and traditions. The Zulus are so named from a legendary chief Zulu, ancestor of Dingiswayo, founder of the Zulu state, about the close of the 18th century. The ruthless military system introduced by him was further developed by his successor, Chaka, during whose reign (1800-28) the Zulu power was firmly established, and the

Zulu name became a terror to all the surrounding peoples. The system was first shaken by collision with the Boer pioneers in 1834-8, when Chaka's successor, Dingaan, was overthrown in Natal, and his great captain, Umzilikatsi, driven from Transvaal across the Limpopo to Matabeleland. But it still persisted for several decades until it was finally suppressed by the English, who in 1879 defeated and deposed Cetywayo, last of Dingiswayo's dynasty, and in 1893 overthrew Umzilikatsi's successor Lobengula. With the capture and deposition of the Zulu chief Gungunyana by the Portuguese in Gazaland (1896) the last remnant of the Zulu military power was overcome. In 1906 a revival of Zulu unrest in Natal was put down by armed force.

Zungaria, a region of the Chinese empire, between the Central Tian Shan and the W. Altai; with an area of 148,000 sq. m., and a population of 600,000 (estimated). On the w. side, Chinese Zungaria is intersected by the Ek-tag Altai, Tarbagatai, and Ala-tau ranges, between which open three great depressions connecting the Aral-Caspian basin with the Mongolian lowlands. These are (1) the Irtysh and Urungu valleys; (2) the valleys of the Sassik-kul, Ala-kul, Ebi-nor, and other lakes forming the 'Zungarian strait'; (3) the valley of Chuguchak. Chinese Zungaria has three principal physical regions—the low-lying steppes and lakes; valleys and arable plateau land of medium elevation; mountains. The Mohammedan inhabitants are generally known as Dungans or Tungans.

Zuñi, the name for a Pueblo dwelling group of Indians in the western part of New Mexico. Their language seems to constitute a distinct stock. They were probably visited by the Spaniards in 1539 and from that time to the present have been in contact with civilized peoples. The tribe is composed of clans and children are usually regarded as belonging to the mother's clan. In all religious functions the clans are important, since each clan has certain duties and the right to certain offices. The tribal government seems to be a hierarchy of four priestly orders, of which the rain priests take the first rank, appointing an executive, or chief, to administer governmental affairs. Houses are built of stones, mud, logs, and brush. Like other Pueblo Indians, the Zuñi live by the produce of their fields. Maize, beans, squashes, and melons are raised in small plots usually made productive by irrigation. Land is not held in common. The arts of weaving,

basketry, and pottery are highly developed.

Living in a region where rainfall is periodical but scanty and where any slight delay in such rainfall threatens the people with famine, it is natural that clouds, thunder and other accompanying phenomena should receive a great deal of attention in philosophic thought and religious practice. Water vessels are ornamented with rain and cloud symbols, and these in turn often symbolize life, or the soul of man. It is in keeping with this that the highest order of the priesthood is that of the rainmakers. The ceremonial affairs of the people are in the keeping of several fraternities. These organizations have regalia, composed chiefly of masks, and perform their rites in underground chambers in which are erected altars representing the mystic guardians of the respective orders. The Zuzi now number only about 1,500. See Cushing's *Zuzi Fetiches*, etc. (Annual Reports of Bureau of Ethnology, 1883, 1886, 1896); Mrs. Stevenson's *The Zuzi Indians* (Annual Report, Bureau of Ethnology, 1904).

Zürich. (1.) Swiss canton. Its area is 665 sq. m. It is the industrial and manufacturing region of Switzerland; p. 616,961. (2.) The most populous and most important town in Switzerland, cap. of the above canton, is built on the Limmat as it issues from the Lake of Zürich; p. 249,130.

Zweig, Arnold (1887-), Austrian author, wrote novels, plays and essays. His works include *Claudia* (1912); *The Case of Sergeant Grisca* (1927).

Zweig, Stefan (1881-1942), Austrian author; wrote *The World of Yesterday* (1942).

Zwickau, town, Saxony. Chemicals, glass, and machinery are manufactured. The church of St. Mary dates from 1451. Schumann, the musical composer, was born here; p. 87,000.

Zwingli, Huldreich, or **Ulrich** (1484-1531), Swiss reformer, born at Wildhaus, in the canton of St. Gall, studied at the University of Vienna, under the humanist Conrad Celtes. In 1502 he went to Basel, where he taught for a time. In 1506 he was called to be pastor of Glarus, and more than once accompanied his parishioners to the wars in Italy as their chaplain. Meantime his studies (in Greek and Hebrew) of the Holy Scriptures, and the influence of Wyttenbach, led him to serious doubts regarding certain doctrines of the church; and these were confirmed by a study of the fathers, and by the influence of Erasmus. During his stay of ten years at Glarus, he made two discoveries which materially affected his future career—

one that it had been the custom in the early Swiss church that immediately after baptism the sacrament of the eucharist should be administered to the child, and the other that the various mass books did not agree. This, to his mind, was sufficient to disprove the claim of the church of Rome that her liturgy had been the same in all ages. From Glarus he went to Einsiedeln, then as now the most famous place of pilgrimage in Switzerland and Southern Germany. There Zwingli preached more freely than he had been able to do at Glarus, declaring that the Scriptures were the only safe rule in matters of faith. At the same time he publicly denied the right of the pope to decide in religious questions, and offered a bitter opposition to the doctrine and use of indulgences. In December, 1519, he was appointed pastor of the cathedral church of Zürich, and there he labored for the remainder of his life, his influence being powerfully exerted upon the side of the reformed doctrines. In January, 1523, at a great council held in the town hall at Zürich, the city council gave an emphatic and official approval of Zwingli's doctrines, and requested all preachers in the canton to present them. In 1531 war was declared by the five papal cantons—Lucerne, Zug, Schwyz, Uri, and Unterwalden—instigated by Rome against the two reformed cantons, Zürich and Bern. The latter were totally defeated, many of them being slain; among the latter was Zwingli. Luther and Zwingli differed widely on the subject of the character of the Lord's Supper; but modern theology has pronounced in favor of the Zwinglian view rather than Luther's. The contention produced a division in Protestantism, splitting the continental supporters of the Reformation into Lutherans and the Reformed Church.

Zworykin, Vladimir Kosma (1889-), American scientist, was born in Russia; educated at Petrograd Institute, College de France, University of Pittsburgh, Brooklyn Polytechnic Institute. He did research work with Westinghouse Company and Radio Corporation; in 1934 invented the 'electric eye'; in 1941 the electron microscope and a device enabling precision bombing.

Zymotic, a term introduced in 1842 by Dr. Farr, to denote the poison and pathological processes of epidemic, endemic, and contagious diseases supposed to be caused by fermentation. The use of the word is now most commonly restricted to the fevers, scarlatina and smallpox, and has been supplanted by the better term, zymotoxic.

